

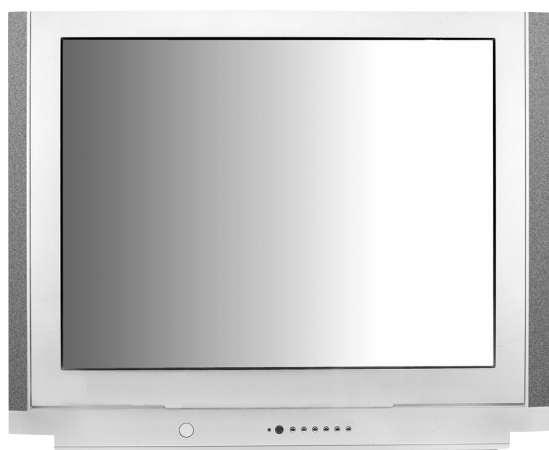
S/M No. : TCP785FEF0

# Service manual

68 Cm STEREO Color Television

CHASSIS : CP-785F

MODEL : DTE-29U1TH  
PF-68T32



**NEC Corporation**

Nov. 2003

# Contents

1 - Main features .....	2
1-1 Specifications .....	2
1-2 External Terminals .....	2
1-3 Channel table .....	4
2 - Safety instruction .....	7
3 - Alignment instructions .....	8
3-1 Microcontroller configuration : Service mode .....	8
3-2 Microcontroller configuration : Option .....	8
3-3 TV set Alignment .....	10
4 - IC description .....	12
4-1 TDA936x TV signal processor - TXT with embedded $\mu$ -Controller .....	12
4-2 MSP341x Multistandard Sound Processor .....	19
4-3 TDA894x J Stereo Audio Amplifier .....	23
4-4 TDA835x J Vertical Amplifier .....	24
4-5 TDA6107JF .....	26
4-6 24C08 8 K bit EEPROM .....	27
4-7 STR-F665X .....	28
5 - Circuit description .....	30
5-1 Block diagram .....	30
5-2 IF .....	34
5-3 Source switching .....	35
5-4 $\mu$ -Controller I/O pin configuration and function .....	35
5-5 Sound processing .....	36
5-6 Sound amplification .....	37
5-7 Vertical deflection .....	38
5-8 Power supply (STR-F665X) .....	39
5-9 TV start-up, TV normal run and stand by mode operations .....	43
6 - Service parts list .....	50
6-1 Part List .....	50
6-2 All Electrical Parts List .....	51
6-3 Control Assembly Parts Lists .....	64
6-4 Compatible Components List .....	65
7 - Exploded view .....	66
8 - PCB Layout .....	67
8-1 Main PCB .....	67
8-2 AV PCB .....	68
9 - Circuit Diagram .....	69

## 1 - Main Features

### 1-1 Specifications

TV standard	PAL, - B/G, H, NTSC(AV Only)
Sound system	NICAM B/G FM 2Carrier B/G
Power consumption	116W approx.
Sound Output Power	5W x 5W (at 60% mod, 10% THD)
Speaker	7W 8 ohm x 2
Teletext system	10 pages memory FASTEXT (FLOF or TOP) : Option
Aerial input	75 ohm unbalanced
Channel coverage	Off-air channels, S-cable channels and hyperband
Tuning system	frequency synthesiser tuning system
Visual screen size	68 Cm
Channel indicatio	On Screen Display
Program Selection	100 programmes
Aux. terminal	INPUT1(RCA) : Audio / Video In. INPUT2(RCA) : Audio / Video In OUTPUT(RCA) : MONITOR OUT DVD:Y/Cr/Cb/Audio in Headphone jack (3.5 mm) on the right front of cabinet
Remote Control Unit	R-44N08(RD-D90) for with Teletext

### 1-2 External Teminals

#### 1-2-1 Input 1 : (The Rear Side) RCA

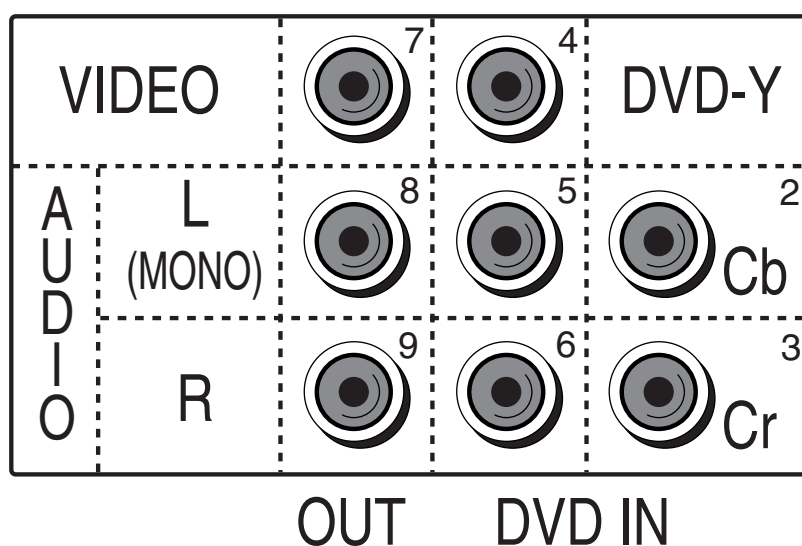
Pin	Signal	Matching value
1(Yellow)	Video Input	1.0 Vpp+/- 3dB, Impedance 75 ohm
2(White)	Audio Input Left	0.5 Vrms, Impedance > 10k ohm
3(Red)	Audio Input Right	0.5 Vrms, Impedance > 10k ohm

#### 1-2-2 Input2 : (The right Side) RCA

Pin	Signal	Matching value
1(Yellow)	Video Input	1.0 Vpp+/- 3dB, Impedance 75 ohm
2(White)	Audio Input Left	0.5 Vrms, Impedance > 10k ohm
3(Red)	Audio Input Right	0.5 Vrms, Impedance > 10k ohm

### 1-2-3 MONITOR OUTPUT & DVD INPUT(THE REAR SIDE)

Pin	Signal	Matching value
2	DVD Cb-in	0.7Vpp +/- 3dB, Impedence 75ohm
3	DVD Cr-in	0.7Vpp +/- 3dB, Impedence 75ohm
4	DVD Y-in	1Vpp +/- 3dB, Impedence 75ohm
5	DVD Audio Left	0.5 Vrms, Impedance > 10 kohm
6	DVD Audio Right	0.5 Vrms, Impedance > 10 kohm
7	Monitor Video-out	1Vpp +/- 3dB, Impedence 75ohm
8	Monitor Audio Left-out	0.5Vrms at RF sound FM 54% Mod(27Khz dev)
9	Monitor Audio Right-out	0.5Vrms at RF sound FM 54% Mod(27Khz dev)



**1-3 Channel table**

FREQUENCY TABLE CP-785F

CH	AUSTRALIA	N/Z' land		
C00	46.25			
C01	57.25			
C02	64.25			
C03	86.25			
C04	95.25			
C05	102.25			
C5A	138.25			
C06	175.25			
C07	182.25			
C08	189.25			
C09	196.25			
C10	209.25			
C11	216.75			
N01	-	45.25		
N02	-	55.25		
N03	-	62.25		
N08	-	203.25		
N09	-	210.25		
N10	-	217.25		
-	-	-		
C21	471.25			
C22	479.25			
C23	487.25			
C24	495.25			
C25	503.25			
C26	511.25			
C27	519.25			
C28	527.25			
C29	534.25			
C30	541.25			
C31	548.25			
C32	555.25			
C33	562.25			
C34	569.25			
C35	576.25			
C36	583.25			
C37	590.25			
C38	597.25			
C39	603.25			
C40	610.25			
C41	617.25			
C42	624.25			

CH	AUSTRALIA	N/Z' land		
C43	631.25			
C44	638.25			
C45	645.25			
C46	652.25			
C47	659.25			
C48	666.25			
C49	673.25			
C50	680.25			
C51	687.25			
C52	694.25			
C53	701.25			
C54	708.25			
C55	715.25			
C56	722.25			
C57	729.25			
C58	736.25			
C59	743.25			
C60	750.25			
C61	757.25			
C62	764.25			
C63	771.25			
C64	779.25			
C65	786.25			
C66	793.25			
C67	800.25			
C68	807.25			
C69	814.25			
C70	-			
C71	-			
C72	-			
C73	-			
C74	-			
C75	-			
C76	-			
C77	-			
S01	105.25			
S02	112.25			
S03	119.25			
S04	126.25			
S05	133.25			
S06	140.25			
S07	147.25			
S08	154.25			
S09	161.25			
S10	168.25			
S11	231.25			

CH	AUSTRALIA	N/Z' land		
S12	238.25			
S13	245.25			
S14	252.25			
S15	259.25			
S16	266.25			
S17	273.25			
S18	280.25			
S19	287.25			
S20	294.25			
S21	303.25			
S22	311.25			
S23	319.25			
S24	327.25			
S25	335.25			
S26	343.25			
S27	351.25			
S28	359.25			
S29	367.25			
S30	375.25			
S31	383.25			
S32	391.25			
S33	399.25			
S34	407.25			
S35	415.25			
S36	423.25			
S37	431.25			
S38	439.25			
S39	447.25			
S40	455.25			
S41	463.25			

## **2 - Safety instruction**

**WARNING:** Only competent service personnel may carry out work involving the testing or repair of this equipment.

### **X-RAY RADIATION PRECAUTION**

1. Excessive high voltage can produce potentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must not exceed the specified limit. The nominal value of the high voltage of this receiver is 28~30 KV at max beam current. The high voltage must not under any circumstances, exceed 32 KV. Each time a receiver requires servicing, the high voltage should be checked. It is important to use an accurate and reliable high voltage meter.
2. The only source of X-ray Radiation in this TV receiver is the picture tube. For continued X-ray RADIATION protection, the replacement tube must be exactly the same type tube as specified in the parts list.

### **SAFETY PRECAUTION**

1. Potentials of high voltage are present when this receiver is operating. Operation of the receiver outside the cabinet or with the back board removed involves a shock hazard from the receiver.
  - 1) Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment.
  - 2) Discharge the high potential of the picture tube before handling the tube. The picture tube is highly evacuated and if broken, glass fragments will be violently expelled.
2. If any Fuse in this TV receiver is blown, replace it with the FUSE specified in the Replacement Parts List.
3. When replacing a high wattage resistor (oxide metal film resistor) in circuit board, keep the resistor 10 mm away from circuit board.
4. Keep wires away from high voltage or high temperature components.
5. This receiver must operate under AC 240 volts, 50 Hz. NEVER connect to DC supply or any other power or frequency.

### **PRODUCT SAFETY NOTICE**

Many electrical and mechanical parts in this equipment have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-ray Radiation protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual and its supplements, electrical components having such features are identified by designated symbol on the parts list. Before replacing any of these components, read the parts list in this manual carefully. The use of substitutes replacement parts which do not have the same safety characteristics as specified in the parts list may create X-ray Radiation.



### 3 - Alignment instructions

#### 3-1 Microcontroller configuration : Service mode

To switch the TV set into service mode please see instruction below.

- 1 - Select pr. number 91
- 2 - Adjust sharpness to minimum value and exit all menu.
- 3 - Quickly press the key sequence : RED - GREEN - menu

To exit SERVICE menu press menu key or Operate(Std By) key.

In Service Mode press OK to stop the microcontroller i.e. the I2C bus is free and the set can be controlled by external equipment. Press OK again to allow the microcontroller to control the set again.

#### 3-2 Microcontroller configuration : Option

Section	ITEMS	BARE DATA	DTE-29U1TH (PF-68T32)	REMARK
For Adjustment (Variable)	AGC	32	23	Variable
	BIAS R/G	31/31	31/31	Variable/Variable
	DRIVE R/G/B	32/32/32	32/32/32	Variable/Variable/FIX
	H-PARALLEL	31	26	FIX
	H-BOW	42	34	FIX
	H-SHIFT	25	33	Variable
	V-SLOPE	32	31	Variable
	V-Amplitude	39	20	Variable
	V. S-Correction	13	29	FIX
	V SHIFT	32	30	Variable
	H-WIDTH	32	42	Variable
	EW Parabola	32	23	Variable
	Up-Conner	32	32	Variable
	Dn-Conner	32	32	Variable
	EW Trapezium	32	29	Variable
For Function Change (OPTION)	Option	04	04	FIX (Tuner option Code)
	(HOTEL)CH LOCK	OFF	Off	
	(HOTEL) Max Vol	15	43	
	Clock Pr.	01	07	
	SVHS	ON	OFF	
	AV START	OFF	OFF	
	KEY LOCK	OFF	OFF	
	SCREEN	24	30	
	DVD IN	OFF	ON	
	AUTO OFF	OFF	ON	

## Option Function

FUNCTION		Description	Remark
Option		- This is the tuner option code.	0,1,2,3 :For D/W Remote controller 4,5,6,7 :For NEC Remote controller
CH LOCK	ON/OFF	- Channel Setting : Impossible/possible - When this function is active, It is impossible to change the channel data(can not enter the INSTALL menu)	
Max Vol	00~43(max)	- this is the limited Volume function. - it is variable to 43(max) from 00(min).	
Clock Pr.		- it change the reference channel for Automatic clock setting.	
SVHS	ON/OFF	- When SVHS is active, The AV mode is changed to SVHS mode.	CP-785F can t operate the S-VHS. It operate to the CP-785A(DTE-29/25G5TH)
AV START	ON/OFF	- When AV start is active, the set always start in av1 mode (main AC switch on/off & remote controller on/off) - In case if virgin EEPROM, the default setting is OFF.	
KEY LOCK	ON/OFF	- When active the local keyboard can t be used. - In case if virgin EEPROM, the default setting is OFF.	
SCREEN		- It is adjust screen point. - It requires for screen adjustment at the manufacture.	
DVD IN	ON/OFF	- When DVD IN is active, The AV mode is changed to DVD mode.	
AUTO OFF	ON/OFF	- When AUTO OFF is active, If broadcasting signal is not present.	

\* Note : These Function is changed only Service Mode not Factory mode. So you must use the user's remote controller

- Change the PR. No. to 91 ==> change the sharpness to 00(min) in Picture control Menu ==> Exit the User control Menu ==> Press the [RED],[GREEN],[MENU] quickly
- Then the Service Menu is appeared.

### 3-3 TV set Alignment

#### 3-3-1 - G2 alignment

- TV in AV mode without video signal → Black screen.
- TV preset with WP Red, WP Green and WP Blue equal to 32.
- TV preset with Black R, Black G equal to 32.
- Set TV in NORMAL I mode
- Adjust screen volume ( on FBT ) such that the highest cathod cut-off voltage measured on CRT board, is V cut off  $\pm 5V$ .

Screen size	Vcut-off
25	140V
29	140V

#### 3-3-2 - White balance

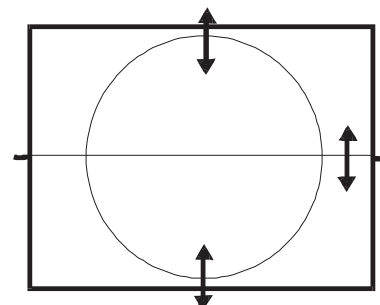
- Select a dark picture and adjust Black G and Black R to the desired colour temperature.
- Select a bright picture and adjust WP Red, WP Green, WP Blue to the desired colour temperature.

#### 3-3-3 - Focus

- Adjust the Focus volume ( on FBT ) to have the best resolution on screen.

#### 3-3-4 - Vertical geometry

- Adjust the Vertical Amplitude, Shift, S-Correction and Slope to compensate for vertical distortion.

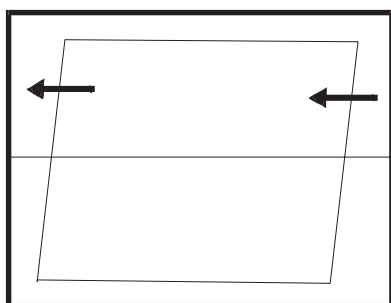


#### 3-3-5 - Horizontal picture centering

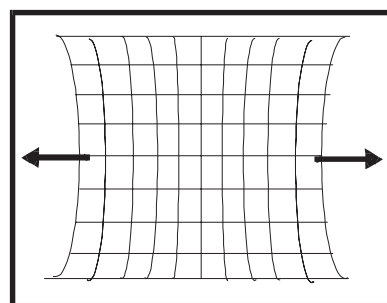
- Adjust H Shift to have the picture in the center of the screen.

#### 3-3-6 - East / West correction

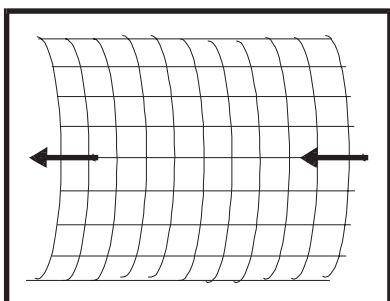
- Adjust the H Parall, H Bow, H Width, EW Parabo, Up Corner, Dw Corner, EW trapez to compensate for geometrical distortion.



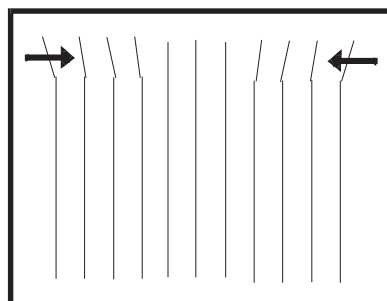
H. Parall



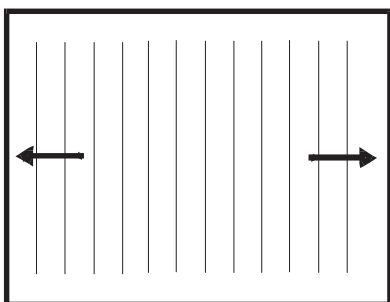
EW.Parabola



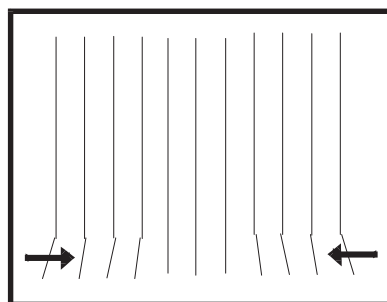
H. Bow



Up Corner



H. Width



Dw Corner

### 3-3-7 - AGC

- Adjust the antenna signal level at 68 dBV 2 (UHF - CH25)
- Set RF AGC to 0.
- Increase RF AGC level and stop when the level on pin 6 of TDA936x goes below 2.5 Vdc

#### 4 - IC description

4-1 TDA936x TV signal processor - Teletext decoder with embedded -Controller.

- TDA936x : TEXT Available

CHASSIS(MODELS)	IC MARKING	TEXT	TV STANDARD
CP-785F (DTE-29U1TH) (PF-68T32)	TDA9365 (DW9365/N2) (DW9365/CH3)	10 PAGE TEXT (Pan-Eur opeun)	PLA/SECAM

#### TV-signal Processor

- Multi-standard vision IF circuit with alignment-free PLL demodulator
- Internal (switchable) time-constant for the IF-AGC circuit
- Source selection between 'Internal' CVBS and external CVBS or Y/C signals
- Integrated chrominance trap circuit
- Integrated luminance delay line with adjustable delay time
- Asymmetrical delay line type peaking in the luminance channel
- Black stretching for non-standard luminance signals
- Integrated chroma band-pass filter with switchable centre frequency
- Only one reference (12 MHz) crystal required for the -Controller, Teletext and the colour decoder
- PAL / NTSC or multistandard colour decoder with automatic search system
- Internal base-band delay line
- RGB control circuit with 'Continuous Cathode Calibration', white point and black level off set adjustment so that the colour temperature of the dark and the bright parts of the screen can be chosen independently.
- The Text/OSD signals are internally supplied from the -Controller/Teletext decoder
- Contrast reduction possibility during mixed-mode of OSD and Text signals
- Horizontal synchronisation with two control loops and alignment-free horizontal oscillator
- Vertical count-down circuit
- Vertical driver optimised for DC-coupled vertical output stages
- Horizontal and vertical geometry processing
- Horizontal and vertical zoom function for 16 : 9 applications
- Horizontal parallelogram and bow correction for large screen picture tubes

### **µController**

- 80C51 µcontroller core standard instruction set and timing
- 1 µs machine cycle
- 32 - 128Kx8-bit late programmed ROM
- 3 - 12Kx8-bit Auxiliary RAM (shared with Display and Acquisition)
- Interrupt controller for individual enable/disable with two level priority
- Two 16-bit Timer/Counter registers
- WatchDog timer
- Auxiliary RAM page pointer
- 16-bit Data pointer
- IDLE and Power Down (PD) mode
- 14 bits PWM for Voltage Synthesis Tuning
- 8-bit A/D converter
- 4 pins which can be programmed as general I/O pin, ADC input or PWM (6-bit) output

### **Data Capture**

- Text memory 10 pages
- Inventory of transmitted Teletext pages stored in the Transmitted Page Table (TPT) and Subtitle Page Table (SPT)
- Data Capture for US Closed Caption
  - Data Capture for 525/625 line WST, VPS (PDC system A) and Wide Screen Signalling (WSS) bit
- decoding Automatic selection between 525 WST/625 WST
- Automatic selection between 625 WST/VPS on line 16 of VBI
- Real-time capture and decoding for WST Teletext in Hardware, to enable optimised - processor throughput
- Automatic detection of FASTEXT transmission
- Real-time packet 26 engine in Hardware for processing accented, G2 and G3 characters
- Signal quality detector for video and WST/VPS data types
- Comprehensive teletext language coverage
- Full Field and Vertical Blanking Interval (VBI) data capture of WST data

### **Display**

- Teletext and Enhanced OSD modes
- Features of lever 1.5 WST and US Close Caption
- Serial and Parallel Display Attributes
- Single/Double/Quadruple Width and Height for characters
- Scrolling of display region
- Variable flash rate controlled by software
- Enhanced display features including overlining, underlining and italics
- Soft colours using CLUT with 4096 colour palette
  - Globally selectable scan lines per row (9/10/13/16) and character matrix [12x10, 12x13, 12x16 (VxH)]
- Fringing (Shadow) selectable from N-S-E-W direction
- Fringe colour selectable
- Meshing of defined area

- Contrast reduction of defined area
- Cursor
- Special Graphics Characters with two planes, allowing four colours per character
- 32 software redefinable On-Screen display characters
- 4 WST Character sets (GO/G2) in single device (e.g. Latin, Cyrillic, Greek, Arabic)
- G1 Mosaic graphics, Limited G3 Line drawing characters
- WST Character sets and Closed Caption Character set in single device

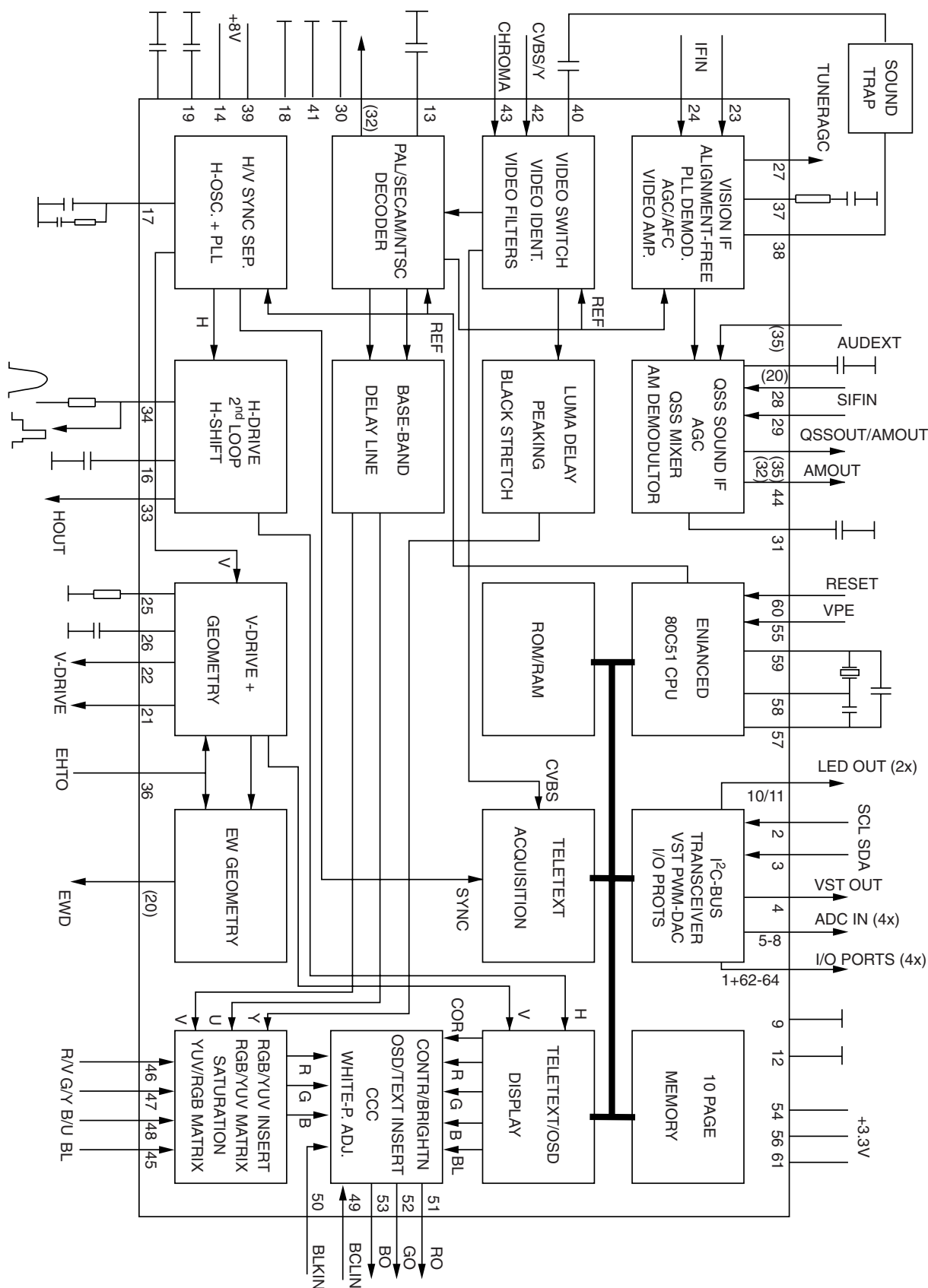
## **Data Capture**

The Data Capture section takes in the analogue Composite Video and Blanking Signal (CVBS), and from this extracts the required data, which is then decoded and stored in memory.

The extraction of the data is performed in the digital domain. The first stage is to convert the analogue CVBS signal into a digital form. This is done using an ADC sampling at 12MHz. The data and clock recovery is then performed by a Multi-Rate Video Input Processor (MulVIP). From the recovered data and clock the following data types are extracted WST Teletext (625/525), Closed Caption, VPS, WSS. The extracted data is stored in either memory (DRAM) via the Memory Interface or in SFR locations.

### **Data Capture Features**

- Video Signal Quality detector
- Data Capture for 625 line WST
- Data Capture for 525 line WST
- Data Capture for US Closed Caption
- Data Capture for VPS data (PDC system A)
- Data Capture for Wide Screen Signalling (WSS) bit decoding
- Automatic selection between 525 WST/625WST
- Automatic selection between 625WST/VPS on line 16 of VBI
- Real-time capture and decoding for WST Teletext in Hardware, to enable optimised microprocessor throughput
- 10 pages stored On-Chip
- Inventory of transmitted Teletext pages stored in the Transmitted Page Table (TPT) and Subtitle Page Table (SPT)
- Automatic detection of FASTEXT transmission
- Real-time packet 26 engine in Hardware for processing accented, G2 and G3 characters
- Signal quality detector for WST/VPS data types
- Comprehensive Teletext language coverage
- Full Field and Vertical Blanking Interval (VBI) data capture of WST data

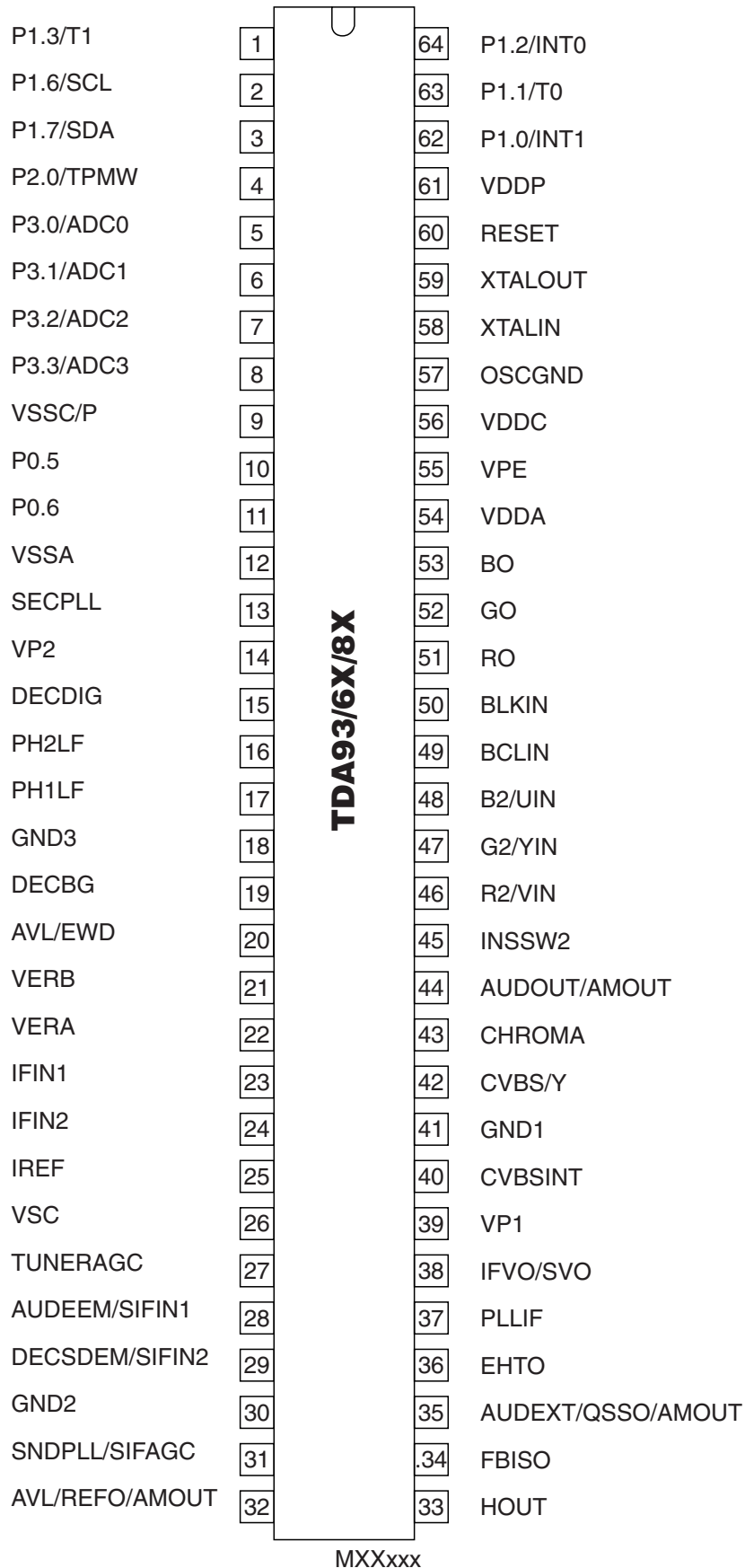




## PINNING

SYMBOL	PIN	DESCRIPTION
n.u.	1	Port 1.3 Not used.
SCL	2	I2C bus clock line
SDA	3	I2C Data line
SW2	4	TV, AV1:High DVD, AV2:Low
OCP	5	Port 3.0 : Over Current Protection
RF AGC in	6	ADC 1 : For factory use only ( High impedance )
Key-in	7	ADC 2 : local key input ( High impedance )
S/W1	8	TV,DVD:High AV1, AV2:Low
VssC/P	9	digital ground for -controller core and peripheral
LED 1	10	port 0.5 ( 8mA current sinking capability )
LED 2	11	port 0.6 ( 8mA current sinking capability )
VSSA	12	analog ground of teletext decoder and digital ground of TV processor
SEC PLL	13	SECAM PLL decoupling
VP2	14	2nd supply voltage TV-processor
DECDIG	15	decoupling digital supply of TV-processor
PH2LF	16	phase-2 filter
PH1LF	17	phase-1 filter
GND3	18	ground 3 for TV-processor
DECBG	19	bandgap decoupling
AVL/EWD	20	East / West drive output
VDRB	21	vertical drive B output
VDRA	22	vertical drive A output
IFIN1	23	IF input 1
IFIN2	24	IF input 2
IREF	25	reference current input
VSC	26	vertical sawtooth capacitor
TUNERAGC	27	tuner AGC output
SIFIN1	28	SIF input 1
SIFIN2	29	SIF input 2
GND2	30	ground 2 for TV processor
SIF AGC	31	AGC sound IF
REF0	32	n.u.
HOUT	33	horizontal output
FBISO	34	flyback input / sandcastle output
QSS out	35	QSS intercarrier output
EHT0	36	EHT/Overvoltage protection
PLLIF	37	IF PLL loop filter
IFVO	38	IF video output
VP1	39	main supply voltage TV-processor
CVBSINT	40	internal CVBS input
GND1	41	ground 1 for TV-processor
CVBS/Y	42	external CVBS/Y input
CHROMA	43	chrominance input (SVHS)
AMOUT	44	n.u.

SYMBOL	PIN	DESCRIPTION
INSSW2	45	2nd RGB insertion input
Cr	46	DVD-Cr
Y	47	DVD-Y
B2IN	48	DVD-Cb
BCLIN	49	beam current limiter input
BLKIN	50	black current input
R0	51	RED Output
G0	52	GREEN Output
B0	53	BLUE Output
VDDA TV-Processor (3.3V)	54	analog supply of Teletext decoder and digital supply of
VPE	55	OTP programming supply
VDDC	56	digital supply to core (3.3V)
OSCGND	57	oscillator ground supply
XTALIN	58	crystal oscillator input
XTALOUT	59	crystal oscillator output
RESET	60	reset
VDDP	61	digital supply to periphery (3.3V)
Audio Mute	62	Port 1.0 : Audio mute output (PushPull )
Power	63	Port 1.1 : Power output (PushPull )
IR in	64	Interrupt input 0 : R/C Infrared input



## 4-2 MSP341x Multistandard Sound Processor

The MSP341x is designed as a single-chip Multistandard Sound Processor for applications in analogue and digital TV sets, video recorders, and PC cards.

MSP341x	MSP3410D, 3415D, 3410G, 3415G	Stereo(Nicam& 2-Carrier)
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### MSP 341x features

- sound IF input
- No external filters required
- Stereo baseband input via integrated AD converters
- Two pairs of DA converters
- Two carrier FM or NICAM processing
- AVC : Automatic Volume Correction
- Bass, treble, volume processing
- Full SCART in/out matrix without restrictions
- Improved FM-identification
- Demodulator short programming
- Autodetection for terrestrial TV - sound standards
- Precise bit-error rate indication
- Automatic switching from NICAM to FM/AM or vice versa
- Improved NICAM synchronisation algorithm
- Improved carrier mute algorithm
- Improved AM-demodulation
- Reduction of necessary controlling
- Less external components

### Basic Features of the MSP 341x Demodulator and NICAM Decoder Section

The MSP 341x is designed to simultaneously perform digital demodulation and decoding of NICAM-coded TV stereo sound, as well as demodulation of FM or AM mono TV sound. Alternatively, two carrier FM systems according to the German terrestrial specs can be processed with the MSP 341x.

The MSP 341x facilitates profitable multistandard capability, offering the following advantages:

- Automatic Gain Control (AGC) for analogue input: input range: 0.10 - 3 Vpp
- integrated A/D converter for sound-IF input
- all demodulation and filtering is performed on chip and is individually programmable
- easy realisation of all digital NICAM standards (B/G, I, L and D/K)
- FM-demodulation of all terrestrial standards (include identification decoding)
- no external filter hardware is required
- only one crystal clock (18.432 MHz) is necessary
- high deviation FM-mono mode (max. deviation: approx. -360 kHz)

#### DSP-Section (Audio Baseband Processing)

- flexible selection of audio sources to be processed
- performance of terrestrial de-emphasise systems (FM, NICAM)
- digitally performed FM-identification decoding and de-matrixing
- digital baseband processing: volume, bass, treble
- simple controlling of volume, bass, treble

#### **Analogue Section**

- two selectable analogue pairs of audio baseband input (= two SCART inputs) input level: <2 V RMS, input impedance: >25 k $\Omega$
- one selectable analogue mono input (i.e. AM sound): Not used in this chassis
- two high-quality A/D converters, S/N-Ratio: >85 dB
- 20 Hz to 20 kHz bandwidth for SCART-to-SCART copy facilities
- loudspeaker: one pair of four-fold oversampled D/A converters  
output level per channel: max. 1.4 VRMS output resistance: max. 5 k $\Omega$   
S/N-ratio: >85 dB at maximum volume max. noise voltage in mute mode: < 10 V (BW: 20 Hz... 16 kHz)
- one pair of four-fold oversampled D/A converters supplying a pair of SCART-outputs.  
output level per channel: max. 2 V RMS, output resistance: max. 0.5 k $\Omega$   
S/N-Ratio: >85 dB (20 Hz... 16 kHz)

#### **Application Fields of the MSP 341x**

In the following sections, a brief overview about the two main TV sound standards, NICAM 728 and German FM Stereo, demonstrates the complex requirements of a multistandard audio IC.

#### **NICAM plus FM/AM-Mono**

According to the British, Scandinavian, Spanish, and French TV-standards, high-quality stereo sound is transmitted digitally. The systems allow two high-quality digital sound channels to be added to the already existing FM/AM-channel. The sound coding follows the format of the so-called Near Instantaneous Companding System (NICAM 728). Transmission is performed using Differential Quadrature Phase Shift Keying (DQPSK). Table below offers an overview of the modulation parameters.

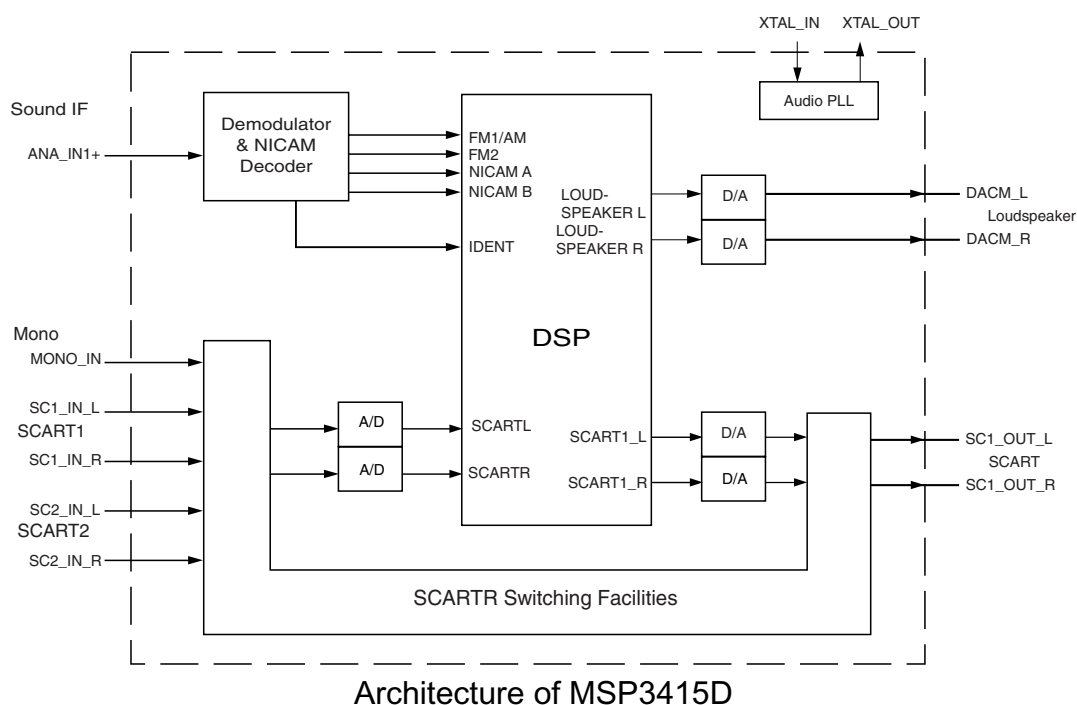
In the case of NICAM/FM (AM) mode, there are three different audio channels available: NICAM A, NICAM B, and FM/AM-mono. NICAM A and B may belong either to a stereo or to a dual language transmission. Information about operation mode and about the quality of the NICAM signal can be read by the controlling software via the control bus. In the case of low quality (high bit error rate), the controlling software may decide to switch to the analogue FM/AM-mono sound. Alternatively, an automatic NICAM-FM/AM switching may be applied.

#### **German 2-Carrier System (DUAL FM System)**

Since September 1981, stereo and dual sound programs have been transmitted in Germany using the 2-carrier system. Sound transmission consists of the already existing first sound carrier and a second sound carrier additionally containing an identification signal. More details of this standard are given in Tables below. For D/K very similar system is used.

## TV standards

TVsystem	Position of sound carrier(MHz)	Sound modulation	Color system	Remark
B/G	5.5 / 5.7421875	FM Stereo	PAL	Applied
B/G	5.5 / 5.85	FM-Mono / NICAM	PAL	Applied
L	6.5 / 5.85	AM - Mono / NICAM	SECAM-L	N.A
I	6.0 / 6.552	FM-Mono / NICAM	PAL	N.A
D/K	6.5 / 6.2578125 D/K1 6.5 / 6.7421875 D/K2 6.5 / 5.85 D/K-NICAM	FM Stereo  FM-Mono / NICAM	SECAM-East	N.A



Architecture of MSP3415D

## Pin connections and short description

Pin No.	Pin Name	Type	Short description
1	TP	Out	Test pin
2	NC		Not Connected
3	NC		Not Connected
4	TP	Out	Test pin
5	TP	Out	Test pin
6	ADR_SEL	In	I2C bus Address select
7	STANDBYQ	In	Standby ( Low-active)
8	NC		Not Connected
9	I2C_CL	In / Out	I2C Clock
10	I2C_DA	In / Out	I2C data
11	TP	In / Out	Test pin
12	TP	In / Out	Test pin
13	TP	Out	Test pin
14	NC		Not Connected
15	TP	Out	Test pin

Pin No.	Pin Name	Type	Short description
16	TP	Out	Test pin
17	TP	Out	Test pin
18	DVSUP		Digital power supply +5V
19	DVSS		Digital Ground
20	NC		Not Connected
21	NC		Not Connected
22	NC		Not Connected
23	NC		Not Connected
24	RESETQ	In	Power-On-reset
25	NC		Not Connected
26	NC		Not Connected
27	VREF2		Reference ground 2 high voltage part
28	DACM_R	Out	Loudspeaker out Right
29	DACM_L	Out	Loudspeaker out Left
30	NC		Not Connected
31	TP	Out	Test pin
32	NC		Not Connected
33	Moni_Out_R		Monitor Out Right
34	Moni_Out_L		Monitor Out Left
35	VREF1		Reference ground 1 high voltage part
36	RF_OUT_R	Out	RF Out Right
37	RF_OUT_L	Out	RF Out Left
38	NC		Not Connected
39	AHVSUP		Analog power supply 8.0V
40	CAPL_M		Volume capacitor MAIN
41	AHVSS		Analog ground
42	AGNDC		Analog reference voltage high voltage part
43	NC		Not Connected
44	NC		Not Connected
45	NC		Not Connected
46	DVD_In_L	In	DVD In Left
47	DVD_In_R	In	DVD In Right
48	ASG2		Analog Shield Ground 2
49	AV_IN_L	In	AV input 2 in, left
50	AV_IN_R	In	AV input 2 in, right
51	ASG1		Analog Shield Ground 1
52	SC1_IN_L	In	AV input 1 in, left
53	SC1_IN_R	In	AV input 1 in, right
54	VREFTOP		Reference voltage IF A/D converter
55	MONO_IN	In	Mono input
56	AVSS		Analog ground
57	AVSUP		Analog power supply
58	ANA_IN1+		In IF input 1
59	ANA_IN1-		In IF common
60	NC		Not Connected
61	TESTEN	In	Test pin
62	XTAL_IN	In	Crystal oscillator
63	XTAL_OUT	Out	Crystal oscillator
64	NC		Test pin

### 4-3 TDA894xJ family Stereo Audio Amplifier

The TDA8946J is a dua-channel audio power amplifier with an output power of 2 x 7W at an 8 ohm load and a 12 V supply. The circuit contains two Bridges Tied Load (BTL) amplifiers with an all-NPN output stage and standby/mute logic. The TDA8946J comes in a 17-pin DIL power package.

#### Features

Few external components

Fixed gain

Standby and mute mode

No on/off switching plops

low standby current

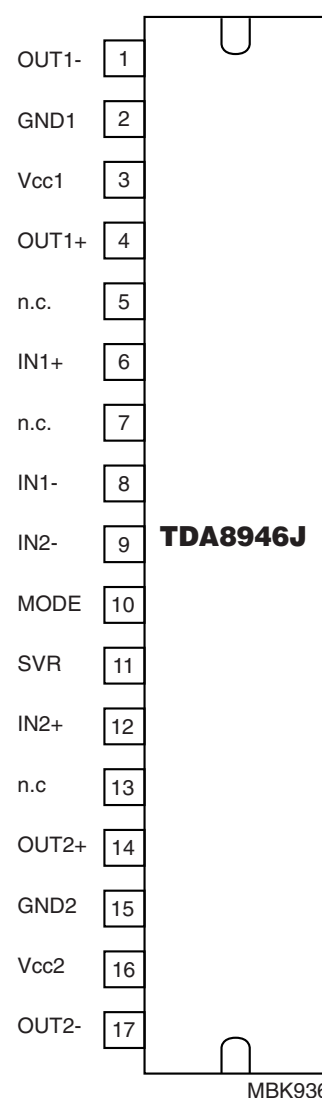
High supply voltage ripple rejection

Outputs short-circuit protected to ground, supply and across the load

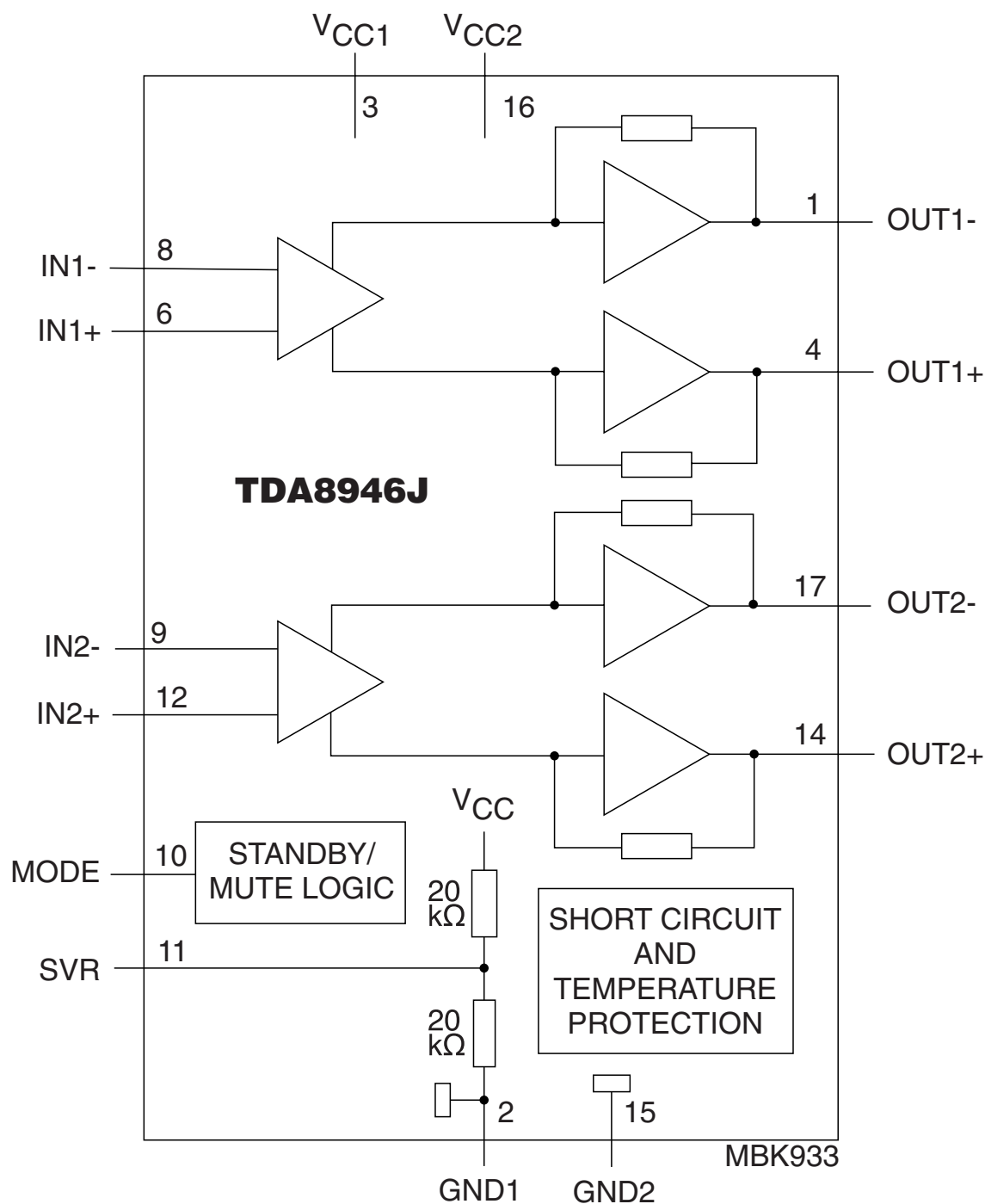
Thermally protected

#### Pin description

Pin	Symbol	Description
1	OUT-	negative loudspeaker terminal 1
2	GND1	ground channel 1
3	Vcc1	supply voltage channel 1
4	OUT1+	positive loudspeaker terminal 1
5	n.c.	not connected
6	IN1+	positive input1
7	n.c.	not connected
8	IN1-	negative input1
9	IN2-	negative input2
10	MODE	mode selection input
11	SVR	half supply voltage decoupling (ripple rejection)
12	IN2+	positive input2







#### 4-4 TDA835xJ Vertical Amplifier

The TDA835xJ are power circuit for use in 90j and 110j colour deflection systems for field frequencies of 25 to 200Hz and 16/9 picture tubes. The circuit provides a DC driven vertical deflection output circuit, operating as a highly efficient class G system. Due to the full bridge output circuit the deflection coils can be DC coupled.

The IC is constructed in a Low Voltage DMOS process that combines Bipolar, CMOS and DMOS devices. MOS transistors are used in the output stage because of the absence of second breakdown.

#### 4-4-1 TDA8358J

An East-West output stage is provided that is able to sink current from the diode modulator circuit.

##### Features :

Few external components

Highly efficient fully DC-coupled vertical output bridge circuit

Short rise and fall time of the vertical flyback switch

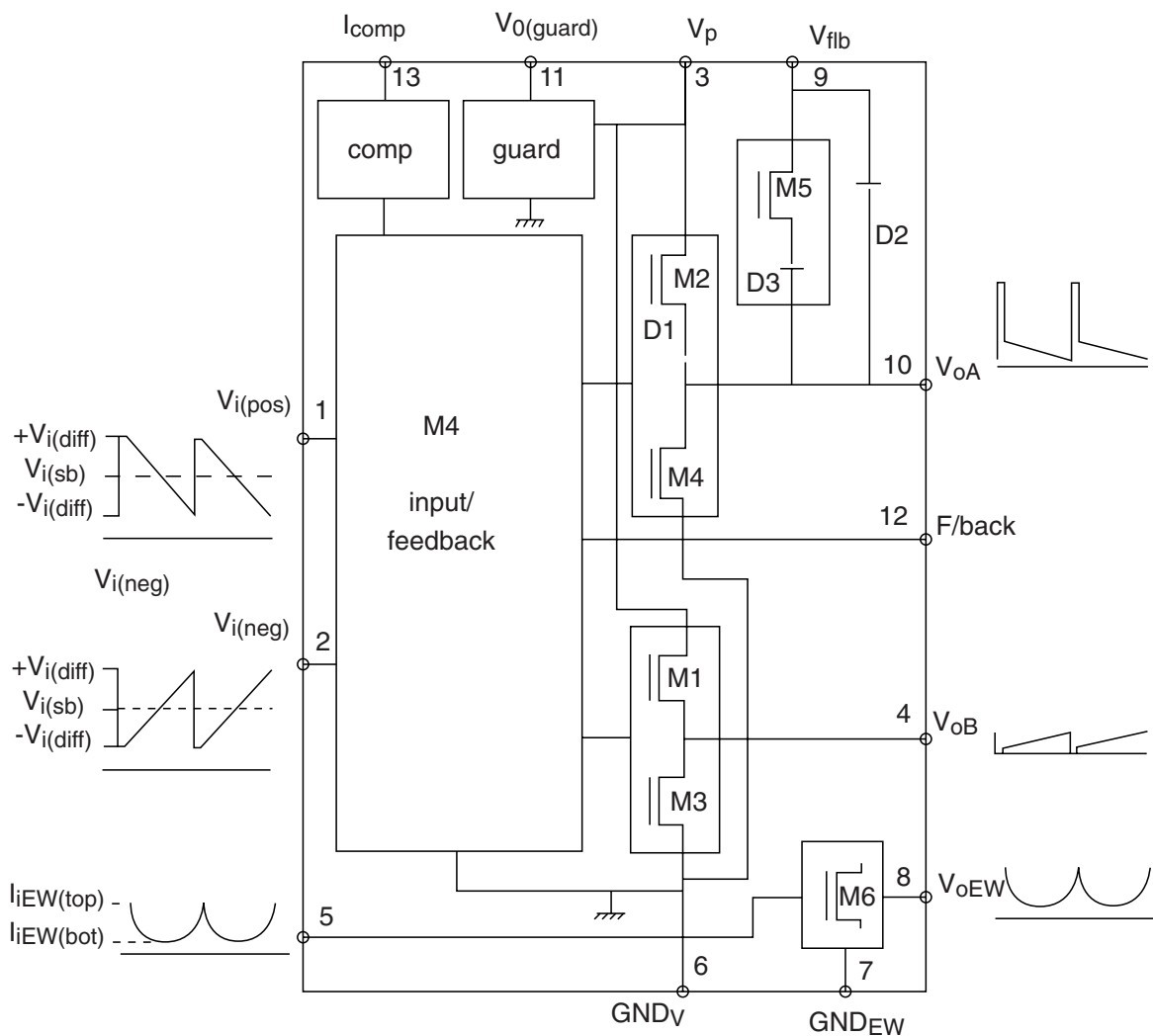
Guard circuit

Temperature (thermal) protection

High EMC because of common mode inputs

East-West output stage

$V_{i(pos)}$	1	<b>TDA8358J</b>
$V_{i(neg)}$	2	
$V_p$	3	
$V_{oB}$	4	
$V_{iew}$	5	
$GND_V$	6	
$GND_{EW}$	7	
$V_{oEW}$	8	
$V_{fb}$	9	
$V_{oA}$	10	
$V_{o(guard)}$	11	
F/back	12	
$I_{comp}$	13	



#### 4-5 TDA6107JF

The TDA6107JF includes three video output amplifiers in one plastic DIL-Bent-SIL 9-pin medium power package, using high voltage DMOS technology, and is intended to drive the three cathodes of a colour CRT directly. To obtain maximum performance, the amplifier should be used with black-current control.

##### Features

Typical bandwidth of 5.5 MHz for an output signal of 60 Vpp

High slew rate of 900V/s

No external components required

Very simple application

Single supply voltage of 200V

Internal reference voltage of 2.5 V

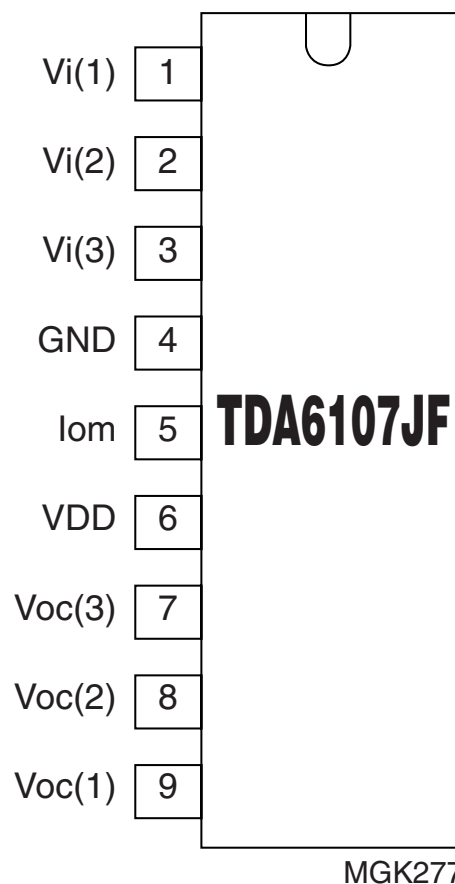
Fixed gain of 50.

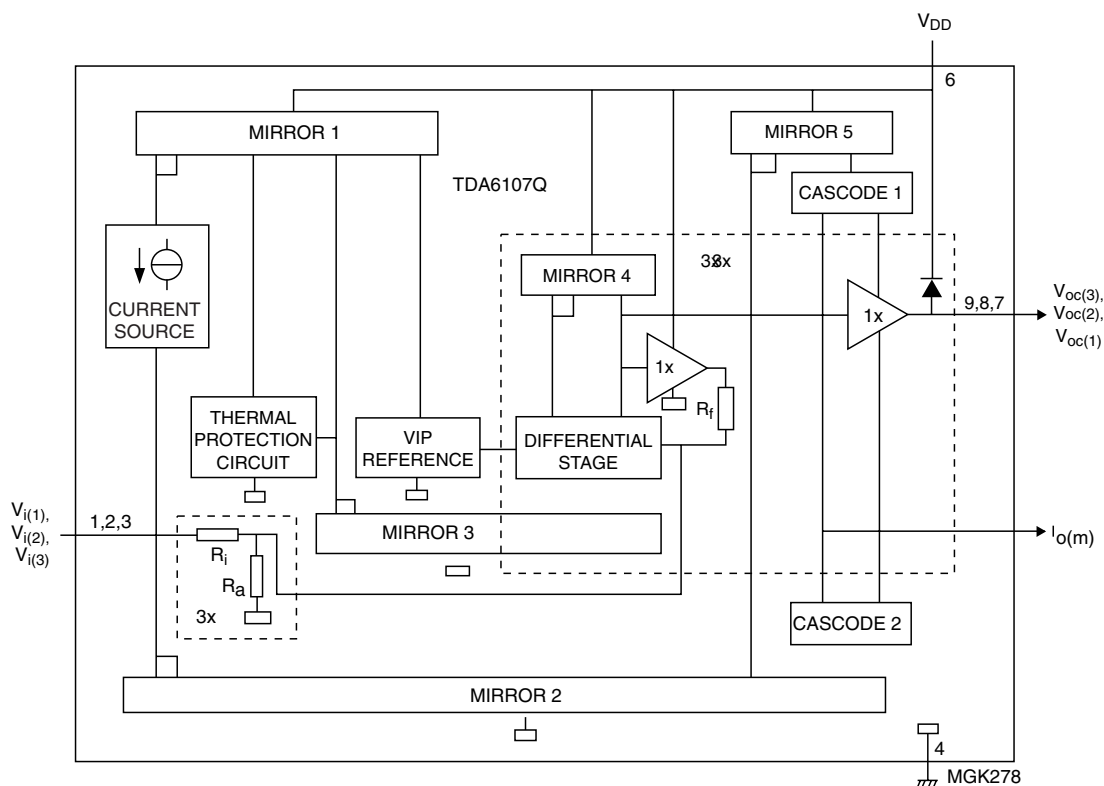
Black-current stabilisation (BCS) circuit

Thermal protection

##### Pin description

Pin	Symbol	Description
1	$V_{i(1)}$	inverting input 1
2	$V_{i(2)}$	inverting input 2
3	$V_{i(3)}$	inverting input 3
4	GND	ground (fin)
5	$I_{om}$	black current measurement output
6	$V_{DD}$	supply voltage
7	$V_{OC(3)}$	cathode output 3
8	$V_{OC(2)}$	cathode output 2
9	$V_{OC(1)}$	cathode output 1





Block diagram TDA6107JF

**4-6 24C08 8 Kbit EEPROM**

features :

8 Kbit serial I2C bus EEPROM

Single supply voltage : 4.5 V to 5.5 V

1 Million Erase/Write cycles (minimum)

40 year data retention (minimum)

**Pin description**

Pin No.	Name	Description
1,2,3	E0, E1, E2	Device address
5	SDA	Serial Data/Address Input/Output
6	SCL	Serial clock
7	WC	Write contro
8	Vcc	Supply voltage
4	Vss	Ground

The memory device is compatible with the I2C memory standard. This is a two wire serial interface that uses a bi-directional data bus and serial clock. The memory carries a built-in- 4-bit unique device type identifier code (1010) in accordance with the I2C bus definition.

**Serial Clock (SCL)**

The SCL input is used to strobe all data in and out of the memory.

**Serial Data (SDA)**

The SDA pin is bi-directional, and is used to transfer data in or out of the memory

## 4-7 STR - F665X

### 4-7-1 General description

The STR-F665X is an hybrid IC with a build-in MOSFET and control IC, designed for flyback converter type switch mode power supply applications.

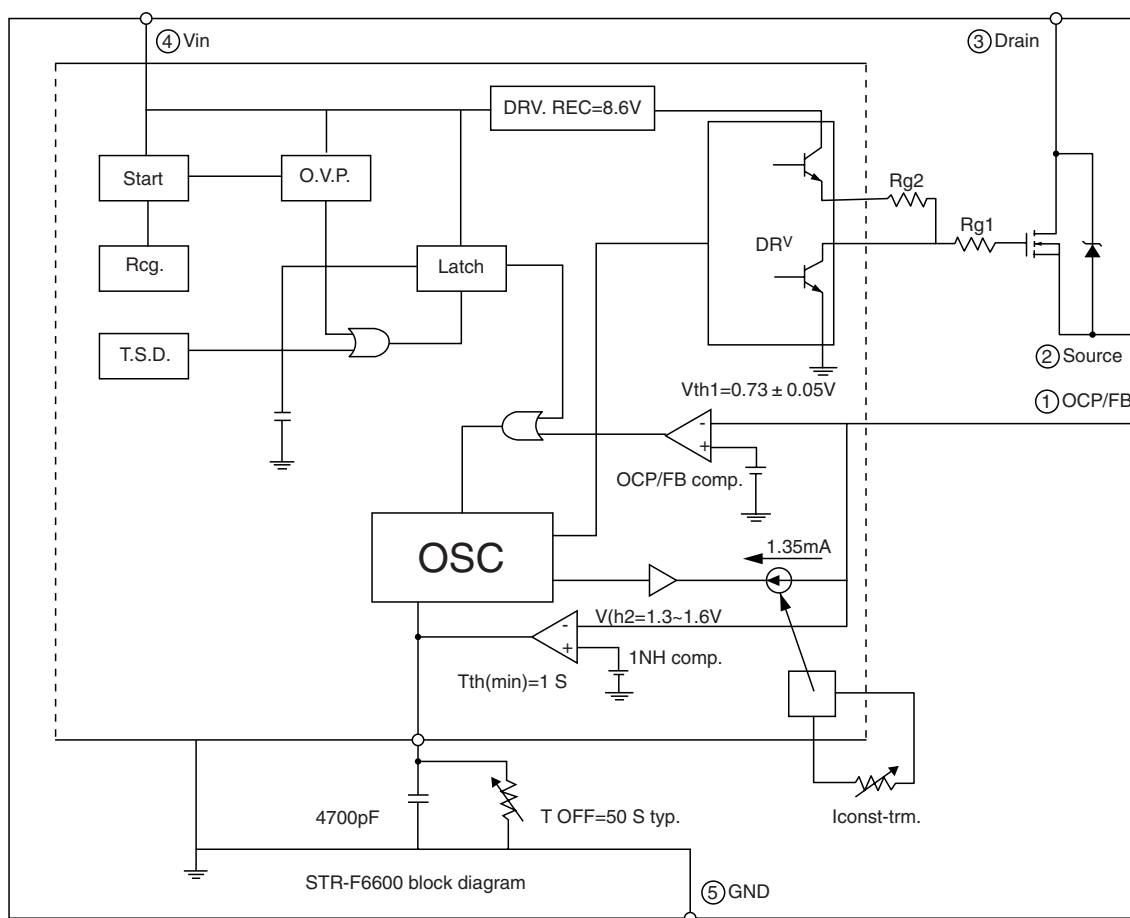
### 4-7-2 Features

Small SIP fully isolated molded 5 pins package

Many protection functions :

- \* Pulse-by-pulse overcurrent protection (OCP)
- \* Overvoltage protection with latch mode (OVP)
- \* Thermal protection with latch mode (TSD)

### 4-7-3 Block diagram



## 4-7-4 Pins description

pin	name	symbol	description
1	Overcurrent / feedback	O.C.P./ F.B.	Input of overcurrent detection signal and feedback signal
2	Source	S	MOSFET source
3	Drain	D	MOSFET drain
4	Supply	V <sub>IN</sub>	Input of power supply for control circuit
5	Ground	GND	Ground

## 4-7-5 Control part electrical characteristics

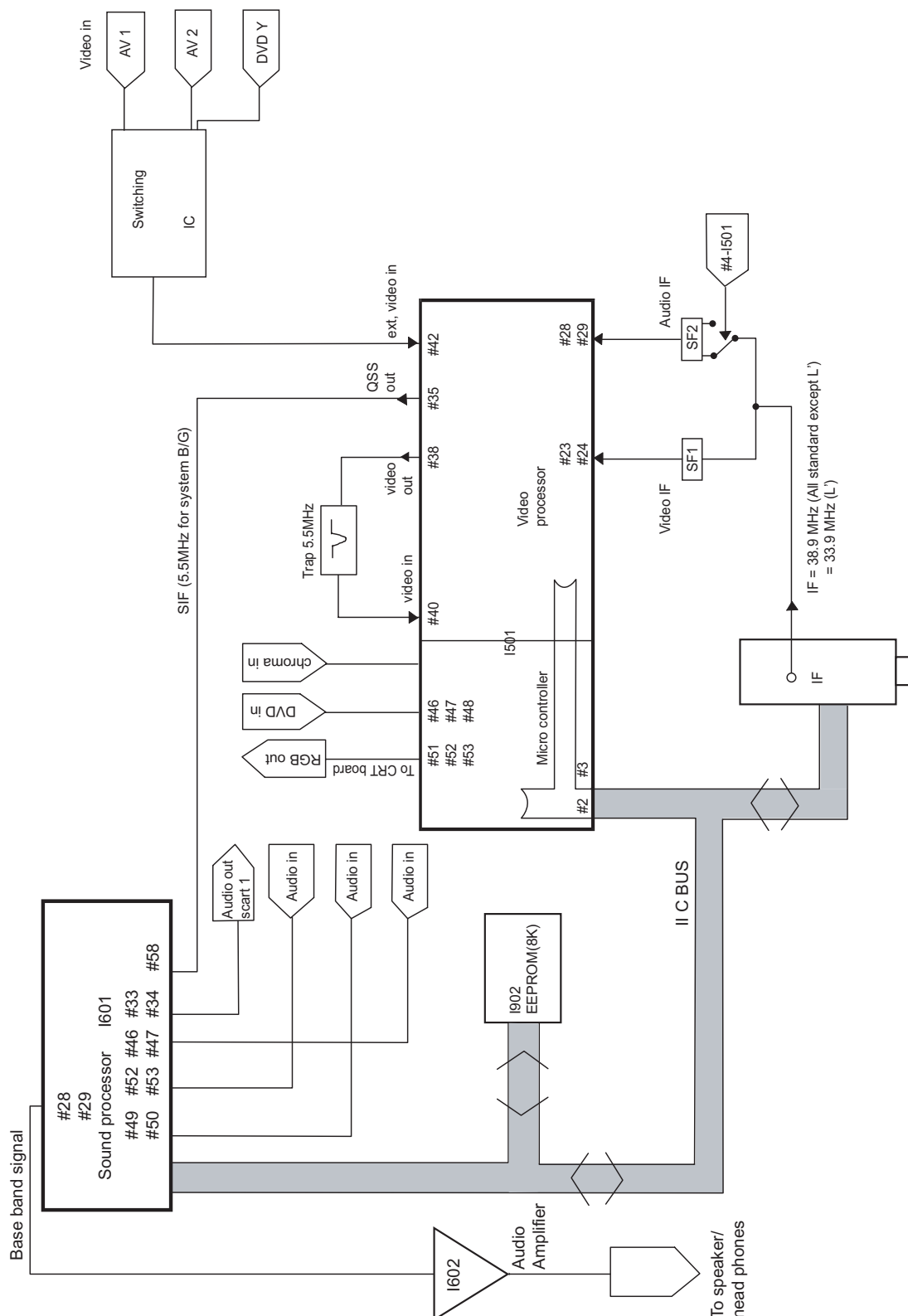
description	IC pins number	symbol	rating			unit
			min.	typ.	max.	
Operation start voltage	4-5	V <sub>IN</sub> (on)	14.4	16	17.6	V
Operation stop voltage	4-5	V <sub>IN</sub> (off)	9	10	11	V
Circuit current in operation	4-5	I <sub>IN</sub> (on)	-	-	30	mA
Circuit current in non-operation	4-5	I <sub>IN</sub> (off)	-	-	100	A
Maximum OFF time	-	T <sub>OFF</sub> (max)	45	-	55	sec
Minimum time for input of quaxi resonant signals	1-5	T <sub>TH</sub> (2)	-	-	1.0	sec
Minimum off time	-	T <sub>OFF</sub> (min)	-	-	1.5	sec
O.C.P./F.B. terminal threshold voltage 1	1-5	V <sub>TH</sub> (1)	0.68	0.73	0.78	V
O.C.P./F.B. terminal threshold voltage 2	1-5	V <sub>TH</sub> (2)	1.3	1.45	1.6	V
O.C.P./F.B. terminal extraction current	1-2	I <sub>OCP/FB</sub>	1.2	1.35	1.5	mA
O.V.P. operation voltage	4-5	V <sub>IN</sub> (OVP)	20.5	22.5	24.5	V
Latch circuit sustaining voltage	4-5	I <sub>IN</sub> (H)	-	-	400	A
Latch circuit release voltage	4-5	V <sub>IN</sub> (La.off)	6.6	-	8.4	V
Thermal shutdown operating temperature	-	T <sub>J</sub> (TSD)	140	-	-	°C

## 4-7-6 MOSFET electrical characteristics

description	IC pins number	symbol	rating			unit
			min.	typ.	max.	
Drain-to-source breakdown voltage	3-2	V <sub>DSS</sub>	650	-	-	V
Drain leakage current	3-2	I <sub>DSS</sub>	-	-	300	μA
On-resistance	3-2	R <sub>DS</sub> (on)	-	-	1.15	Ω
Switching time	3-2	t <sub>f</sub>	-	-	250	nsec
Thermal resistance	-	θ <sub>CH-F</sub>	-	-	0.95	°C/W

## 5 - Circuit description

### 5-1 Block diagram



## **FUNCTIONAL DESCRIPTION OF VIDEO PROCESSOR Vision IF amplifier**

The vision IF amplifier can demodulate signals with positive and negative modulation. The PLL demodulator is completely alignment-free.

The VCO of the PLL circuit is internal and the frequency is fixed to the required value by using the clock frequency of the -Controller/Teletext decoder as a reference. The setting of the various frequencies is made by the controlling software in subaddress 27H (38.9 Mhz for all system). Because of the internal VCO the IF circuit has a high immunity to EMC interferences.

### **QSS Sound circuit**

The sound IF amplifier is similar to the vision IF amplifier and has an external AGC decoupling capacitor.

The single reference QSS mixer is realised by a multiplier. In this multiplier the SIF signal is converted to the intercarrier frequency by mixing it with the regenerated picture carrier from the VCO. The mixer output signal is supplied to the output via a high-pass filter for attenuation of the residual video signals. With this system a high performance hi-fi stereo sound processing can be achieved.

### **Video switches**

The video switch has one input for an external CVBS. The selected CVBS signal can be supplied to pin 38, the IF video output.

The video ident circuit is connected to the selected signal. This ident circuit is independent of the synchronisation.

### **Synchronisation circuit**

The IC contains separator circuits for the horizontal and vertical sync pulses and a data-slicing circuit which extracts the digital teletext data from the analogue signal.

The horizontal drive signal is obtained from an internal VCO which is running at a frequency of 25 MHz. This oscillator is stabilised to this frequency by using a 12 MHz signal coming from the reference oscillator of the -Controller/Teletext decoder.

The horizontal drive is switched on and off via the soft start/stop procedure. This function is realised by means of variation of the TON of the horizontal drive pulses.

The vertical synchronisation is realised by means of a divider circuit. The vertical ramp generator needs an external resistor and capacitor. For the vertical drive a differential output current is available. The outputs are DC coupled to the vertical output stage.



In the TDA936x series, the following geometry parameters can be adjusted for all picture tubes :

- Horizontal shift
- Vertical amplitude
- Vertical slope
- S-correction
- Vertical shift

The types which are intended to be used in combination with 110j picture tubes have an East-West control circuit. The additional controls for these types are:

- EW width
- EW parabola width
- EW upper and lower corner parabola correction
- EW trapezium correction
- Vertical zoom, horizontal parallelogram and bow correction.

### **Chroma and luminance processing**

The chroma band-pass and trap circuits (including the SECAM cloche filter) are realised by means of gyrators and are tuned to the right frequency by comparing the tuning frequency with the reference frequency of the colour decoder. The luminance delay line and the delay cells for the peaking circuit are also realised with gyrators. The circuit contains a black stretcher function which corrects the black level for incoming signals which have a difference between the black level and the blanking level.

### **Colour decoder**

The ICs can decode PAL, NTSC and SECAM signals. The PAL/NTSC decoder does not need external reference crystals but has an internal clock generator which is stabilised to the required frequency by using the 12 MHz clock signal from the reference oscillator of the -Controller/Teletext decoder.

The Automatic Colour Limiting (ACL) circuit (switchable via the ACL bit in subaddress 20H) prevents that oversaturation occurs when signals with a high chroma-to-burst ratio are received. The ACL circuit is designed such that it only reduces the chroma signal and not the burst signal. This has the advantage that the colour sensitivity is not affected by this function.

### **SOFTWARE CONTROL**

The CPU communicates with the peripheral functions using Special function Registers (SFRS) which are addressed as RAM locations. The registers for the Teletext decoder appear as normal SFRs in the -Controller memory map and are written to these functions by using a serial bus. This bus is controlled by dedicated hardware which uses a simple handshake system for software synchronisation.

For compatibility reasons and possible re-use of software blocks, the TV processor is controlled by I2C bus. The TV processor control registers cannot be read. Only the status registers can be read ( Read address 8A ).

The SECAM decoder contains an auto-calibrating PLL demodulator which has two references, via the divided 12 MHz reference frequency (obtained from the  $\mu$ -Controller) which is used to tune the PLL to

the desired free-running frequency and the bandgap reference to obtain the correct absolute value of the output signal. The VCO of the PLL is calibrated during each vertical blanking period, when the IC is in search or SECAM mode.

The base-band delay line (TDA 4665 function) is integrated. This delay line is also active during NTSC to obtain a good suppression of cross colour effects. The demodulated colour difference signals are internally supplied to the delay line.

### **RGB output circuit and black-current stabilisation**

In the RGB control circuit the signal is controlled on contrast, brightness and saturation. The ICs have a linear input for external RGB signals. The signals for OSD and text are internally supplied to the control circuit. The output signal has an amplitude of about 2 Volts black-to-white at nominal input signals and nominal settings of the various controls.

To obtain an accurate biasing of the picture tube the 'Continuous Cathode Calibration' system has been included in these ICs. A black level off set can be made with respect to the level which is generated by the black current stabilisation system. In this way different colour temperatures can be obtained for the bright and the dark part of the picture.

The black current stabilisation system checks the output level of the 3 channels and indicates whether the black level of the highest output is in a certain window or below or above this window. This indication is read from the status byte 01 and is used for automatic adjustment of the Vg2 voltage during the production of the TV receiver.

During switch-off of the TV receiver a fixed beam current is generated by the black current control circuit. This current ensures that the picture tube capacitance is discharged. During the switch-off period the vertical deflection is placed in an overscan position so that the discharge is not visible on the screen.

## 5-2 IF

The TDA936x has an alignment free IF PLL demodulator. The fully integrated oscillator is automatically calibrated, using the 12 Mhz crystal as a frequency reference. The IF frequency is simply set in TV-Processor by I2C bus.

The AFC information is available via I2C bus from the TV-Processor status bytes. The controlling software uses this information for tuner frequency tracking ( automatic following ). The AFC windows is typically 125Khz wide. The minimum frequency step of the tuner is 62.5 Khz.

This AFC function is disabled when a program is tuned using the direct frequency entry or after fine tuning adjustment. Therefore it is recommended to tune channel with the TV search function ( manual or Auto setup) or using the direct channel entry to enable the Automatic Frequency Control.

### SAW filters

Ref.	Standard	Features
K3953M	B/G	<ul style="list-style-type: none"><li>- IF filter for video application</li><li>- TV IF filter with Nyquist slopes at 38.9 MHz</li><li>- Constant group delay</li></ul>
K9650M	B/G	<ul style="list-style-type: none"><li>- IF filter for audio application</li><li>- TV IF audio filter with two channels</li><li>- Channel ( B/G) with one pass band for sound carriers 33.40 MHz</li></ul>

The SAW filter ( SF1 ) has a double Nyquist slope at 38.9 MHz needed for this multistandard application. The disadvantage of this choice is that a 5.5 MHz trap filter ( Z501 ) is needed to suppress the residual sound carrier in the video for B/G signals.

### 5-3 Source switching

The TDA936x has only one external video input, the external video switching circuit made with IA01(Video Switching IC)allows 3 external video signal inputs. The switching command can be the -Controller pin 8 and pin 4 when the software takes control of the video source.

The -Controller pin 8 and pin 4 is automatically configured by the controlling software (See table below).

TV MODE	u-Controller pin 8 Status	u-Controller pin 4 Status	REMARK
RF	H	H	$1V \leq H \leq 5V$
AV1	H	L	$L < 1V$
AV2	L	L	
DVD	L	H	

The controlling software via I2C bus selects the signal source :

- Video signal from tuner ( Pin 40 ).
- External video ( AV1, AV2, DVD ) depending on IA01(Video Switching IC)

The sound source switching is done in the MSP341XD ( I601 ), by the -Controller via I2C bus.

### 5-4 $\mu$ -Controller I/O pin configuration and function

The I/O pins of the -Controller can be configured in many way. All port functions can be individually programmed by use of the SFR registers.

Each I/O port pin can be individually programmed in these configurations :

#### Open drain

In this mode, the port can function as in and output. It requires an external pull-up resistor. The maximum allowable supply voltage for this pull up resistor is +5V.

So in this mode it is possible to interface a 5 Volt environment like I2C while the -Controller has a 3.3 Volt supply.

#### Push-Pull

The push pull mode can be used for output only. Both sinking and sourcing is active, which leads to steep slopes. The levels are 0 and Vddp, the supply voltage 3.3Volts.

High impedance

This mode can be used for input only operation of the port.

### Special port for LED

Pin 10 and 11 have the same functionality as the general I/O pins but in addition, their current source and sink capacity is 8 mA instead of 4 mA. These pins are used for driving LED s via a series current limiting resistor.

$\mu$ -Controller I/O pin configuration and function table

pin	name	configuration		description
		Stand by	TV ON	
1	n.u.	High impedance	High impedance	not used
2	SCL	Open Drain	Open Drain	Serial clock line
3	SDA	Open Drain	Open Drain	Serial data line
4	A/V SW	High Impedance	See Table Above	External Video Switch
5	OCP	High impedance	High impedance	Over Current Protection ( Switch the set OFF if the voltage on this pin is <2.33V )
6	-	High impedance	High impedance	For factory use only
7	Key in	High impedance	High impedance	Local keyboard input
8	A/V SW	High impedance	See table above	external video switch
10	Red LED	High impedance	Open Drain	
11	Green LED	Open Drain	High impedance	
62	Audio mute	Push Pull	Push Pull	High in stand by mode

## 5-5 Sound processing

Analogue sound IF - input section

The input pins ANA\_IN1+ and ANA\_IN- offer the possibility to connect sound IF sources to the MSP 3415D. The analogue-to-digital conversion of the preselected sound IF signal is done by an A/D converter, whose output is used to control an analogue automatic gain circuit (AGC), providing an optimal level for a wide range of input levels.

Quadrature Mixers

The digital input coming from the integrated A/D converter may contain audio information at a frequency range of theoretically 0 to 9 MHz corresponding to the selected standards. By means of two programmable quadrature mixers, two different audio sources ; for example, NICAM and FM-mono, may be shifted into baseband position.

Phase and AM discrimination

The filtered sound IF signals are demodulated by means of the phase and amplitude discriminator block. On the output, the phase and amplitude is available for further processing. AM signals are derived from the amplitude information, whereas the phase information serves for FM and NICAM demodulation.

In case of NICAM - mode, the phase samples are decoded according the DQPSK - coding scheme. The output of this block contains the original NICAM bitstream.

#### DSP section

All audio baseband functions are performed by digital signal processing (DSP). The DSP section controls the source and output selection, and the signals processing.

#### Sound Mode switching

In case of NICAM transmission, the controlling software read the bit error rate and the operation mode from the NICAM Decoder. When the set is in Auto detection mode ( default mode after ATSS ) the controlling software set automatically the sound mode ( NICAM mono, NICAM Dual 1 or NICAM Dual 2 ) depending on the transmitted mode.

In case of 2 Carrier FM transmission, the controlling software read the transmission mode and the signal quality level from the Stereo Detection Register. When the set is in Auto detection mode the controlling software set automatically the sound mode ( mono, Stereo, Dual 1, Dual 2 ) depending on the transmitted mode.

In Auto detection mode the controlling software evaluate the signal quality and automatically switch to the analogy sound carrier 1, if the transmission quality is too poor. To avoid unwanted automatic switching the threshold levels mono to stereo and stereo to mono is different. In forced mono mode ( Red OSD in recall section ), the controlling software configure the MSP3415D to demodulate only the analogue (FM or AM) sound carrier 1, no matter the signal quality.

The sound mode forced or Autodetect is stored for each programme.

### 5-6 Sound amplification

The TDA8946J is a stereo BTL audio amplifier capable of delivering 2 x 7 W output power to an 8  $\Omega$  load at THD = 10%, using a 12 V power supply and an external heatsink. The voltage gain is fixed at 32dB.

With the three-level MODE input the device can be switched from standby to mute and to operating mode.

The TDA 8946J outputs are protected by an internal thermal shutdown protection mechanism and short-circuit protection.

#### Power amplifier

The power amplifier is a Bridge Tied Load (BTL) amplifier with an all-NPN output stage, capable of delivering a peak output current of 1.5 A.

The BTL principle offers the following advantages :

- Lower peak value of the supply current.
- The ripple frequency on the supply voltage is twice the signal frequency.
- No DC-blocking capacitor
- Good low frequency performance

#### Mode selection

The TDA894xJ has several functional modes, which can be selected by applying the proper DC voltage to pin MODE.

Mute : In this mode the amplifier is DC biased but not operational (no audio output). This allows the input coupling capacitors to be charged to avoid pop-noise. The device is in mute mode when  $2.5\text{ V} < V_{\text{MODE}} < (V_{\text{CC}} - 1.5\text{ V})$ .

Operating : In this mode the amplifier is operating normally. The operating mode is activated at  $V_{\text{MODE}} < 0.5\text{ V}$ .

### **5-7 Vertical deflection**

The vertical driver circuit is a bridge configuration. The deflection coil is connected between the output amplifiers, which are driven in phase opposition. The differential input circuit is voltage driven. The input circuit is especially intended for direct connection to driver circuits which deliver symmetrical current signals, but is also suitable for asymmetrical currents. The output current of these devices is converted to voltages at the input pins via resistors R350 and R351. The differential input voltage is compared with the output current through the deflection coils measured as voltage across R302, which provides internal feedback information. The voltage across R302 is proportional to the output current. Flyback voltage

The flyback voltage is determined by an additional supply voltage  $V_{\text{flb}}$ . The principle of operation with two supply voltages (class G) makes it possible to fix the supply voltage  $V_p$  optimum for the scan voltage and the second supply voltage  $V_{\text{flb}}$  optimum for the flyback voltage. Using this method, very high efficiency is achieved. The supply voltage  $V_{\text{flb}}$  is almost totally available as flyback voltage across the coil, this being possible due to the absence of a coupling capacitor.

#### **Protection**

The output circuit has protection circuits for :

- Too high die temperature
- overvoltage of output stage A

#### **Guard circuit**

The guard signal is not used by the TDA936x to blank the screen in case of fault condition.

#### **Damping resistor**

For HF loop stability a damping resistor (R305) is connected across the deflection coil.

#### **EAST-WEST Amplifier (TDA8358J only)**

The East-West amplifier is current driven. It can only sink currents of the diode modulator circuit. A feedback resistor R397 is connected between the input and output of this inverting amplifier in order to convert the East-West correction input into an output voltage.



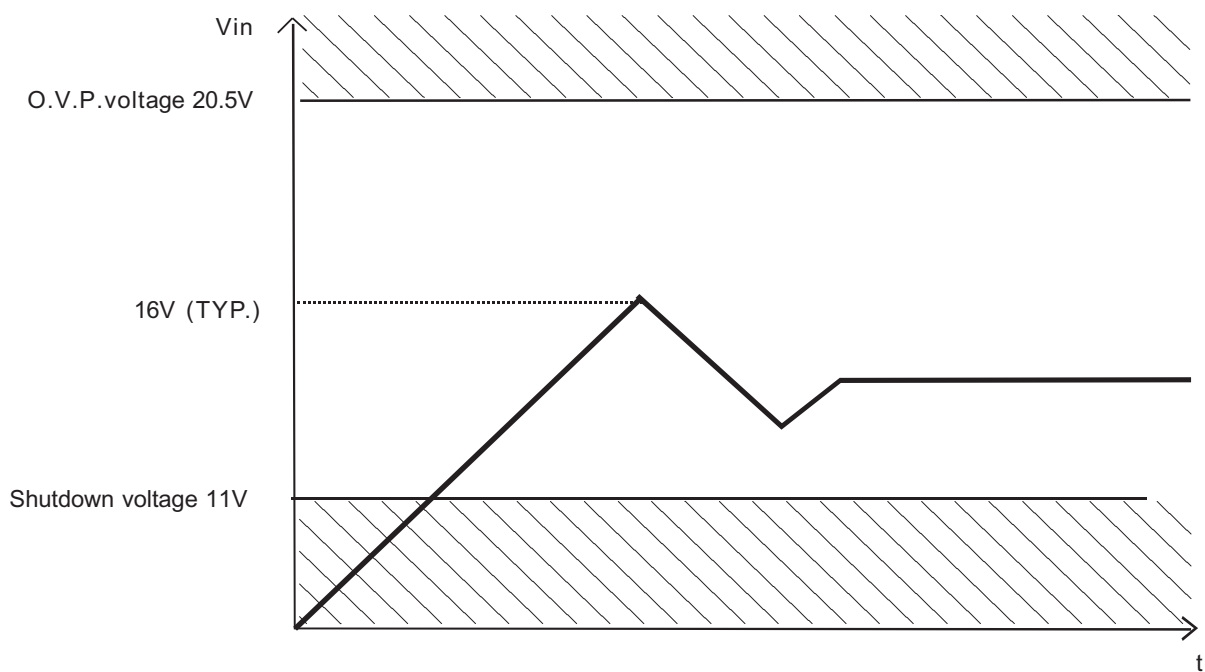


When the power switch is pushed on,  $V_{IN}$  increases slowly. During this time, C806 is charged through R802.

As soon as  $V_{IN}$  reaches 16V, the STR-F665X control circuit starts operating. Then,  $V_{IN}$  is obtained by smoothing the winding voltage which appears between pin6 and pin7 of the SMPS transformer.

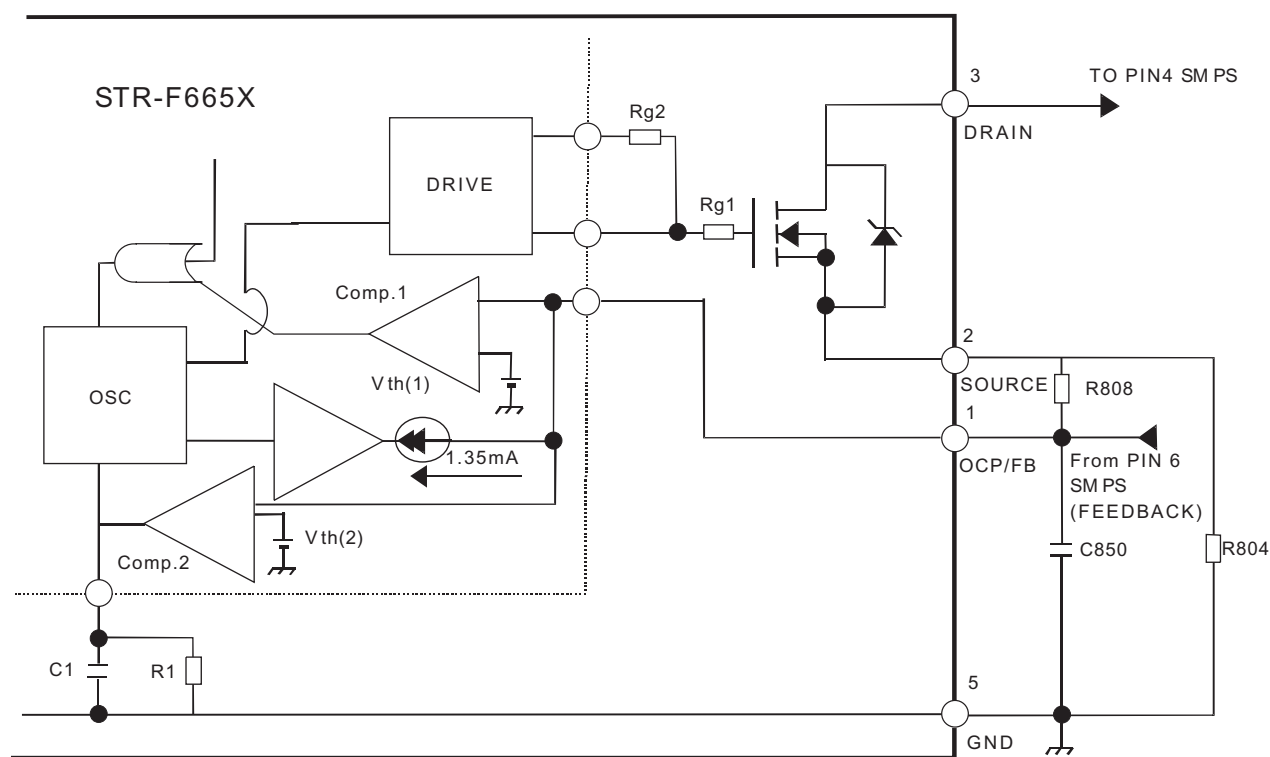
As this winding voltage does not increase to the set voltage immediately after the control circuit starts operating,  $V_{IN}$  starts dropping. However, as this winding voltage reaches the set value before  $V_{IN}$  voltage drops to the shutdown voltage (at 11V), the control circuit continues operating (see below  $V_{IN}$  voltage at start-up). R805 resistor prevents that  $V_{IN}$  pin voltage varies according to the secondary side output current.

$V_{IN}$  must be set higher than the shutdown voltage ( $V_{IN}(\text{off}) = 11V_{\text{max}}$ ) and lower than the O.V.P. (overvoltage protection) operating voltage ( $V_{\text{OVP}} = 20.5V_{\text{min}}$ )

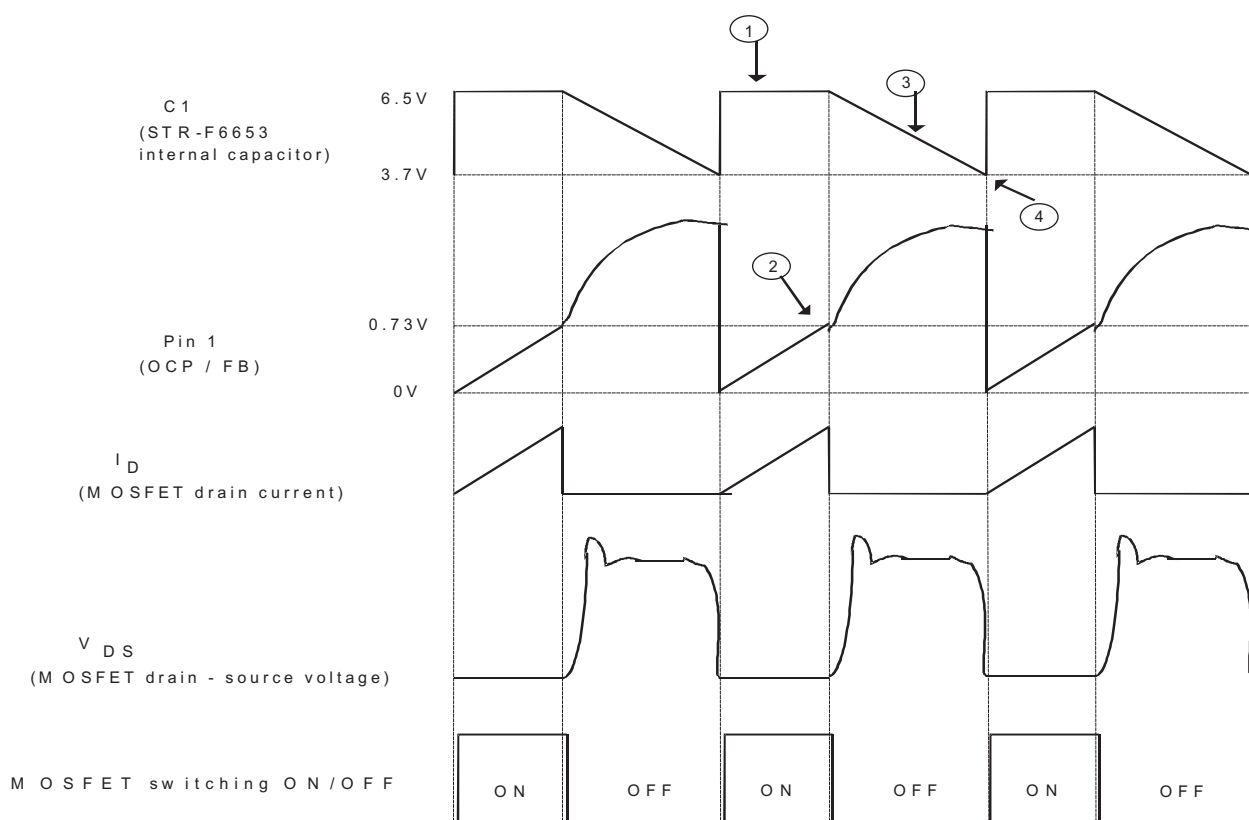


Waveform of  $V_{in}$  pin voltage at start-up

\* STR-F665X oscillating operation



### Oscillating operation



### Waveforms during oscillating operation

- ① When the MOSFET is ON, the STR-F665X internal capacitor C1 is charged at the constant voltage 6.5V.  
At the same time, the voltage at pin 1 (OCP / FB) increases with the same waveform as the MOSFET drain current.
- ② When the pin 1 voltage reaches the threshold voltage  $V_{TH1} = 0.73V$ , the STR-F665X internal comparator 1 starts operating. The STR-F665X internal oscillator is inverted and the MOSFET turns OFF.
- ③ When the MOSFET turns OFF, charging of STR-F665X internal capacitor C1 is released and C1 starts discharging by the STR-F665X internal resistance R1. So, C1 voltage starts falling in accordance with the gradient regulated by the constant discharging time of C1 and R1. So, this means that the fixed time determined by C1 and R1 is the OFF-time of the MOSFET.
- ④ When C1 voltage falls to around 3.7V, the STR-F665X internal oscillator is reversed again and the MOSFET turns ON. C1 is quickly charged to around 6.5V

The MOSFET continues to oscillate by repeating the above procedure.

\* STR-F665X protection circuits

overcurrent protection function (OCP)

Overcurrent protection is performed pulse by pulse detecting at STR-F665X pin 1 (OCP) the peak of the MOSFET drain current in every pulse.

latch circuit

This circuit sustains an output low from the STR-F665X internal oscillator and stops operation of the power supply when overvoltage protection (OVP) and thermal shutdown (TSD) circuit are under operation

thermal shutdown circuit (TSD)

This circuit triggers the latch circuit when the frame temperature of STR-F665X IC exceeds 140°C

overvoltage protection circuit (OVP)

This circuit triggers the latch circuit when the  $V_{in}$  voltage exceeds 22V (typ.)



- . If the TV set was on normal run mode before switching off, the microcontroller delivers horizontal drive voltage at pin 33 and picture appears on screen.
- . If the TV set was on stand-by mode before switching off, the microcontroller switches TV set to stand-by mode, decreasing power pin voltage (pin 63). This matter will be explained on paragraph 5-9-2-b.

## 5-9-2 TV normal run and stand-by mode operations

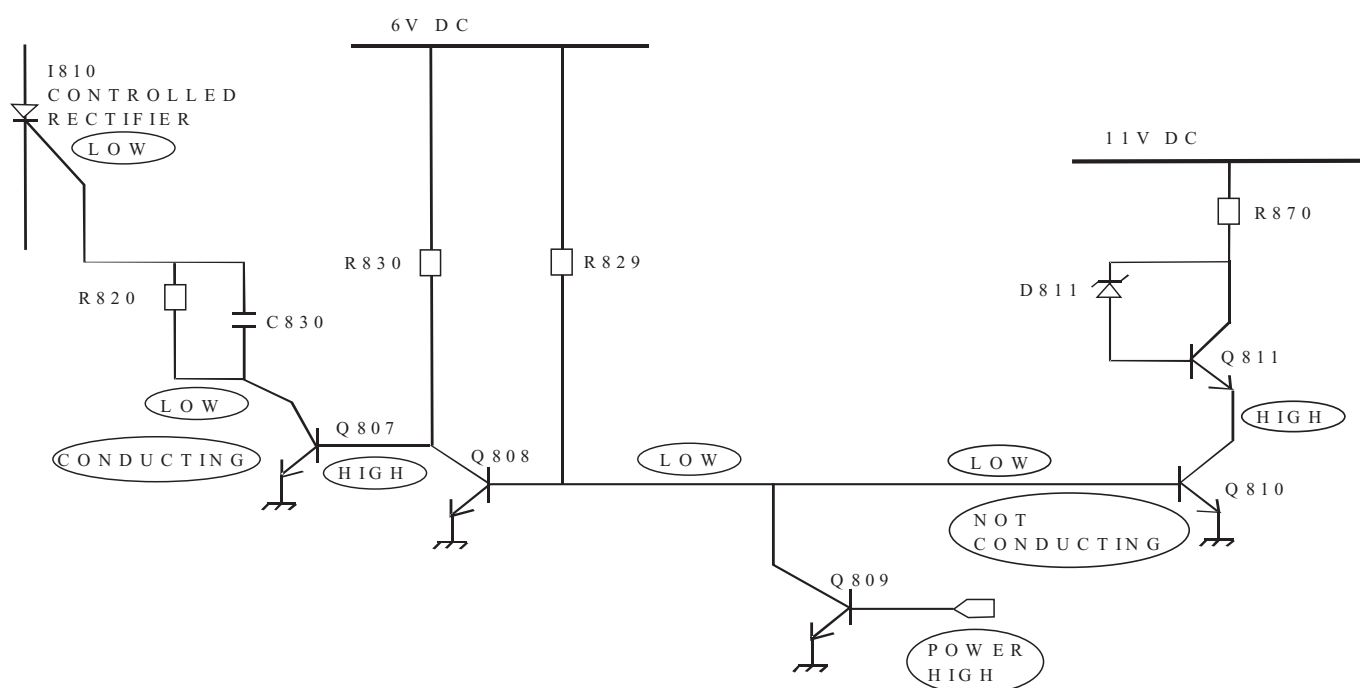
Depending on remote control commands, I501 microcontroller part pin 63 (power) is set to:

- high for normal run mode
- low for stand-by mode

a) TV on normal run mode

\* I501 microcontroller part pin 63 (power) effect

I501 microcontroller part pin 63 (power) is connected to the following circuit:



I501 microcontroller part pin 63 (POWER) effect



\* power supply functioning during TV set normal run mode

- I801 transmits controlled pulses to T801 which generates DC voltages after rectifications by secondary part diodes and electro capacitors (by example by D820 and C813 on 143V supply voltage line).
- 8V, 5V, 3.3V supply voltage lines have stabilized voltages obtained by I820, Q822, I823 voltage regulators.
- On 143V supply voltage line, R823 resistor has been chosen to reach exact DC voltage required on this line.
- 143V supply voltage line includes an IC error amplifier (I806) which corrects unexpected DC voltage variations on this line.

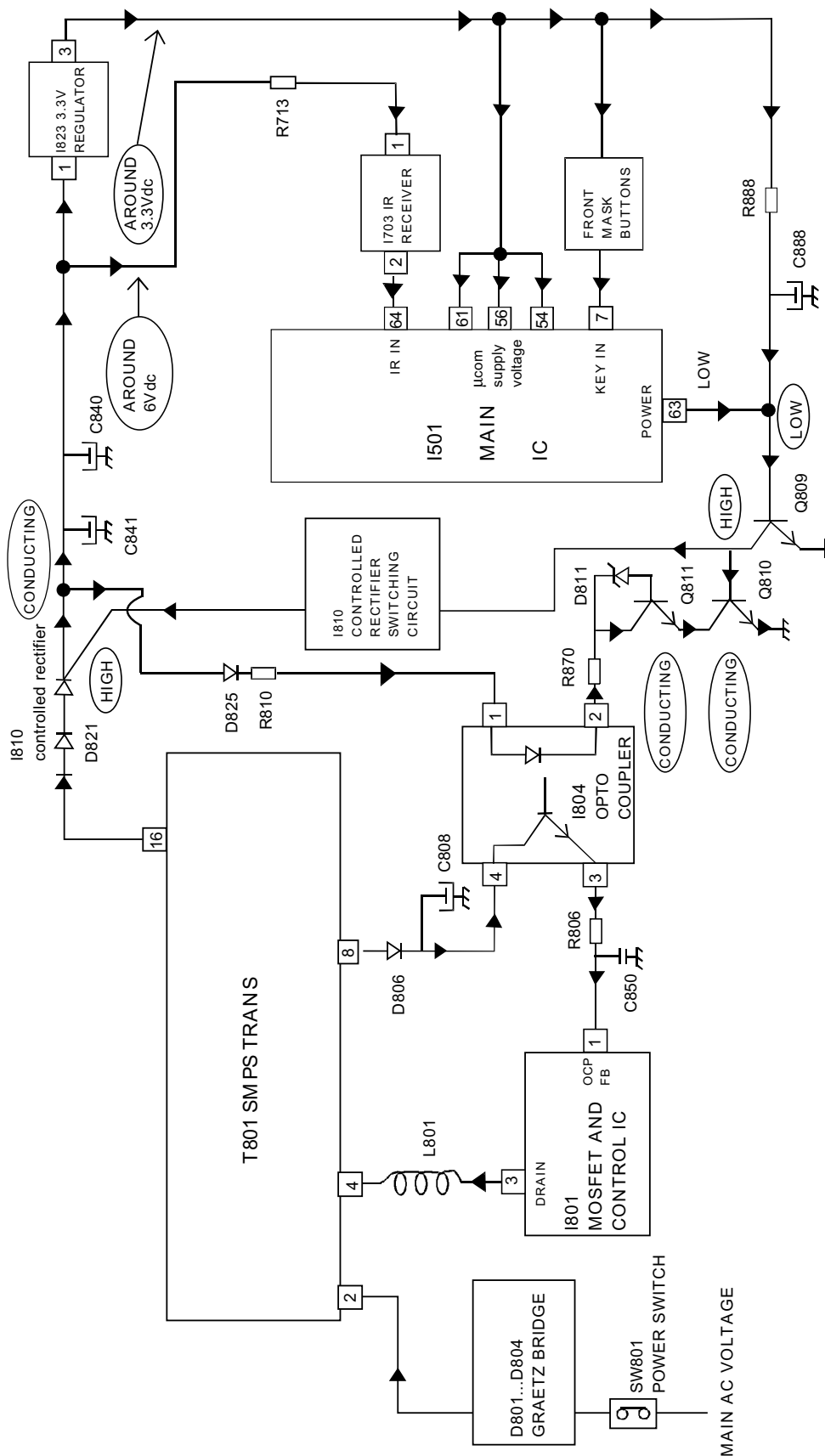
\* power supply IC delivery during TV set normal run

power supply line	IC power supply delivery	Remarks
143V	FBT	FBT supplies 55V to I301 vertical IC FBT supplies 55V to T401 H- drive FBT supplies 14V to I301 vertical IC FBT supplies 33V to the tuner FBT supplies 205V to I901 video amplifier pin 6
12V	I602 sound amplifier pins 3-16	
12V	T401 H- drive	
8V	I501 Main IC pins 14-39 I601 Sound Demod pins 39-40	
6V	I703 IR receiver pin 1 I601 Sound Demod pins 7-18-57	
5V	I702 EEPROM pin 8 tuner	
3.3V	Main IC com part pins 54-56-61	

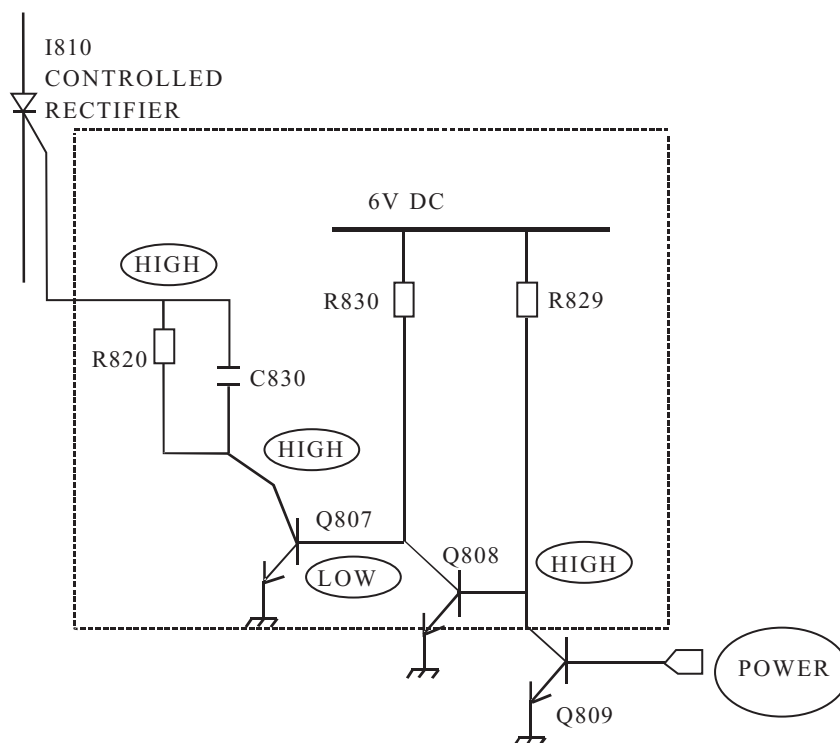


b) TV set on stand-by mode

\* TV set circuit diagram on stand-by mode



### Power supply operation in stand - by mode



I810 controlled rectifier switching circuit

\* TV set stand-by mode operations

- On stand-by mode, I501 microcontroller pin 63 (power) is set to low.
- So, Q809 collector is set to high.
- Then, I810 controlled rectifier gate pin is set to high and I810 is conducting.
- So, current flows from pin 16 SMPS transformer to the ground via I804 optocoupler and Q810 and Q811 transistors (which are conducting).
- In these conditions, I801 delivers pulses on light mode and T801 produces voltages with reduced power.
- As I810 is conducting, current flows also from pin 16 SMPS transformer to I823 (3.3V regulator) for I501 com, IR receiver and front mask buttons supply voltage (then, remote control or front mask buttons can be activated to leave stand-by mode).

## 6 - Service Parts List

### 6-1. Parts List

**Caution** In this Manual, some parts can be changed for improving, their performance without notice in the parts list. So, if you need the latest parts information, please refer to PPL(Prats Price List) in Service information Center (<http://svc.dwe.co.kr>)

**Caution** △ is safety component, so it must be used the same component.

Ⓡ is a recommendable part for stock.

LOC	PART NAME	PART Code	PART Description	Remark
ZZ100	TRANSMITTER REMOCON	48B4744N08	R-44N08 (AA)	With Text(RD-D90)
00030	BATTERY	4850Q00810	R6P/LN	
ZZ120	COVER BACK AS	PTBCSHK016	DTQ-29U1SC	
ZZ131	CRT GROUND NET	48519A6410	2902S-1015-1P	
ZZ132	COIL DEGAUSSING	58G0000149	DC-29SF	△
V901	CRT	4859641561	A68QCU770X58 M50	△
ZZ200	MASK FRONT AS	PTFMSJK016	DTE-29U1	
P601A	CONNECTOR	4850704S32	YH025-04+YRT205+ULW900500	
SP01	SPEAKER	4858311110	12W 8 OHM SP-58126F	
SP02	SPEAKER	4858311110	12W 8 OHM SP-58126F	
ZZ290	PCB MAIN MANUAL AS	PTMPMSD913	DTE-29U1TH	
ZZ300	PCB UNION AS	PTUNSWD913	DTE-29U1TH	

## 6-2. All Electrical Parts List

### -Main PCB Assembly Parts List

LOC	PART NAME	PART Code	PART Description	Remark
C101	C ELECTRO	CEXF1H100V	50V RSS 10MF (5X11) TP	
C102	C ELECTRO	CEXF1H470V	50V RSS 47MF (6.3X11) TP	
C103	C CERA	CCXB1H102K	50V B 1000PF K (TAPPING)	
C104	C CERA	CCXB1H102K	50V B 1000PF K (TAPPING)	
C106	C ELECTRO	CEXF1H220V	50V RSS 22MF (5X11) TP	
C108	C CERA	CCXB1H101K	50V B 100PF K (TAPPING)	
C120	C CERA	CCXB1H102K	50V B 1000PF K (TAPPING)	
C121	C ELECTRO	CEXF1H100V	50V RSS 10MF (5X11) TP	
C305	C ELECTRO	CEXF1E471V	25V RSS 470MF (10X16) TP	
C313	C MYLAR	CMXM2A104J	100V 0.1MF J (TP)	
C315	C ELECTRO	CEXF2C470C	160V RUS 47MF (13X25) TP	
C320	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C350	C CERA	CCXF1H473Z	50V F 0.047MF Z (TAPPING)	
C351	C CERA	CCXF1H473Z	50V F 0.047MF Z (TAPPING)	
C370	C MYLAR	CMXM2A473J	100V 0.047MF J (TP)	
C401	C ELECTRO	CEXF1H100C	50V RUS 10MF (5X11) TP	
C402	C MYLAR	CMYH3C692J	1.6KV BUP 6900PF J	
C404	C MYLAR	CMYH3C692J	1.6KV BUP 6900PF J	
C408	C MYLAR	CMYE2G394J	400V PU 0.39MF J	
C409	C CERA	CXCH2H470J	500V CH 47PF J (TAPPING)	
C412	C ELECTRO	CEXF2C339C	160V RUS 3.3MF (8X11.5) TP	
C414	C MYLAR	CMXM2A104J	100V 0.1MF J (TP)	
C418	C CERA	CCXB1H102K	50V B 1000PF K (TAPPING)	
C420	C CERA	CCXB2H222K	500V B 2200PF K (TAPPING)	
C430	C MYLAR	CMXH3C122J	1.6KV BUP 1200PF J (TP)	
C431	C MYLAR	CMXE2D103J	200V PU 0.01MF J (TP)	
C440	C MYLAR	CMXE2G273J	400V PU 0.027MF J (TP)	
C499	C ELECTRO	CEYD1H689W	50V RHD 6.8MF (16X35.5)	
C501	C ELECTRO	CEXF1H479V	50V RSS 4.7MF (5X11) TP	
C502	C ELECTRO	CEXF1H479V	50V RSS 4.7MF (5X11) TP	
C503	C ELECTRO	CEXF1H479V	50V RSS 4.7MF (5X11) TP	
C509	C ELECTRO	CEXF1E470V	25V RSS 47MF (5X11) TP	
C511	C MYLAR	CMXL1J224J	63V MEU 0.22MF J (TP)	
C512	C MYLAR	CMXL1J224J	63V MEU 0.22MF J (TP)	
C513	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C514	C ELECTRO	CEXF1E101V	25V RSS 100MF (6.3X11) TP	
C515	C CERA	CBZR1C222M	16V Y5R 2200PF M (AXIAL)	
C516	C CERA	CBZR1C472M	16V Y5R 4700PF M (AXIAL)	
C517	C ELECTRO	CEXF1H109V	50V RSS 1MF (5X11) TP	
C518	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C519	C ELECTRO	CEXF1H109V	50V RSS 1MF (5X11) TP	
C520	C CERA	CCZB1H102K	50V B 1000PF K (AXIAL)	
C521	C CERA	CCZB1H102K	50V B 1000PF K (AXIAL)	

LOC	PART NAME	PART Code	PART Description	Remark
C522	C ELECTRO	CEXF1C471V	16V RSS 470MF (8X12)TP	
C523	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C524	C MYLAR	CMXL1J104J	63V MEU 0.1MF J	
C525	C CERA	CCXB1H102K	50V B 1000PF K (TAPPING)	
C526	C MYLAR	CMXL1J104J	63V MEU 0.1MF J	
C527	C MYLAR	CMXM2A473J	100V 0.047MF J (TP)	
C528	C ELECTRO	CEXF1E101V	25V RSS 100MF (6.3X11) TP	
C529	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C530	C ELECTRO	CEXF1E101V	25V RSS 100MF (6.3X11) TP	
C531	C CERA	CCXF1H473Z	50V F 0.047MF Z (TAPPING)	
C532	C ELECTRO	CEXF1H100V	50V RSS 10MF (5X11) TP	
C533	C CERA	CCXB1H102K	50V B 1000PF K (TAPPING)	
C534	C CERA	CCXF1H223Z	50V F 0.022MF Z (TAPPING)	
C535	C CERA	CCXF1H223Z	50V F 0.022MF Z (TAPPING)	
C536	C CERA	CCXF1H223Z	50V F 0.022MF Z (TAPPING)	
C537	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C540	C ELECTRO	CEXF1H100V	50V RSS 10MF (5X11) TP	
C541	C ELECTRO	CEXF1H100V	50V RSS 10MF (5X11) TP	
C542	C ELECTRO	CEXF1H100V	50V RSS 10MF (5X11) TP	
C544	C ELECTRO	CEXF1H100V	50V RSS 10MF (5X11) TP	
C550	C ELECTRO	CEXF1H229V	50V RSS 2.2MF (5X11) TP	
C555	C ELECTRO	CEXF1C470V	16V RSS 47MF (5X11) TP	
C560	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C561	C ELECTRO	CEXF1E101V	25V RSS 100MF (6.3X11) TP	
C564	C ELECTRO	CEXF1E101V	25V RSS 100MF (6.3X11) TP	
C565	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C577	C CERA	CCXB1H561K	50V B 560PF K (TAPPING)	
C585	C CERA	CCXB1H222K	50V B 2200PF K (TAPPING)	
C590	C CERA	CXCH1H270J	50V CH 27PF J (TAPPING)	
C591	C CERA	CXCH1H270J	50V CH 27PF J (TAPPING)	
C592	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C593	C ELECTRO	CEXF1E101V	25V RSS 100MF (6.3X11) TP	
C601	C CERA	CCXB1H472K	50V B 4700PF K (TAPPING)	
C602	C ELECTRO	CEXF1H100V	50V RSS 10MF (5X11) TP	
C603	C CERA	CCXB1H472K	50V B 4700PF K (TAPPING)	
C604	C ELECTRO	CEXF1E102V	25V RSS 1000MF (13X20) TP	
C605	C ELECTRO	CEXF1E470V	25V RSS 47MF (5X11) TP	
C606	C ELECTRO	CEXF1H109V	50V RSS 1MF (5X11) TP	
C607	C ELECTRO	CEXF1H109V	50V RSS 1MF (5X11) TP	
C608	C ELECTRO	CEXF1H109V	50V RSS 1MF (5X11) TP	
C609	C ELECTRO	CEXF1H109V	50V RSS 1MF (5X11) TP	
C610	C ELECTRO	CEXF1H100V	50V RSS 10MF (5X11) TP	
C611	C ELECTRO	CEXF1H339V	50V RSS 3.3MF (5X11) TP	
C612	C ELECTRO	CEXF1H109V	50V RSS 1MF (5X11) TP	
C613	C ELECTRO	CEXF1H109V	50V RSS 1MF (5X11) TP	
C616	C ELECTRO	CEXF1H100V	50V RSS 10MF (5X11) TP	

LOC	PART NAME	PART Code	PART Description	Remark
C617	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C618	C ELECTRO	CEXF1C470V	16V RSS 47MF (5X11) TP	
C620	C CERA	CXCH1H509D	50V CH 5PF D (TAPPING)	
C621	C CERA	CXCH1H509D	50V CH 5PF D (TAPPING)	
C622	C CERA	CCXF1H223Z	50V F 0.022MF Z (TAPPING)	
C625	C ELECTRO	CEXF1H479V	50V RSS 4.7MF (5X11) TP	
C626	C ELECTRO	CEXF1H479V	50V RSS 4.7MF (5X11) TP	
C629	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C630	C ELECTRO	CEXF1E470V	25V RSS 47MF (5X11) TP	
C631	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C635	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C636	C ELECTRO	CEXF1H220V	50V RSS 22MF (5X11) TP	
C650	C CERA	CZCH1H470J	50V CH 47PF J	
C660	C ELECTRO	CEXF1H100V	50V RSS 10MF (5X11) TP	
C661	C MYLAR	CMXL1J224J	63V MEU 0.22MF J (TP)	
C662	C MYLAR	CMXL1J224J	63V MEU 0.22MF J (TP)	
C663	C MYLAR	CMXM2A103J	100V 0.01MF J (TP)	
C664	C MYLAR	CMXM2A103J	100V 0.01MF J (TP)	
C665	C CERA	CBZR1C472M	16V Y5R 4700PF M (AXIAL)	
C666	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C667	C CERA	CBZR1C472M	16V Y5R 4700PF M (AXIAL)	
C668	C MYLAR	CMXL1J224J	63V MEU 0.22MF J (TP)	
C669	C MYLAR	CMXL1J224J	63V MEU 0.22MF J (TP)	
C698	C CERA	CXCH1H470J	50V CH 47PF J (TAPPING)	
C699	C CERA	CXCH1H470J	50V CH 47PF J (TAPPING)	
C770	C ELECTRO	CEXF1E101V	25V RSS 100MF (6.3X11) TP	
C771	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C801	C LINE ACROSS	CL1UC3474M	0.47MF 1J(UCVSNDF/SV)+Q/O	△
C803	C CERA	CCXF3A472Z	1KV F 4700PF Z (T)	
C804	C CERA	CCXF3A472Z	1KV F 4700PF Z (T)	
C805	C ELECTRO	CEYN2W151P	450V LHS 150MF (25X40)	
C806	C ELECTRO	CEXF1H330V	50V RSS 33MF (6.3X11) TP	
C807	C CERA	CCXF1H473Z	50V F 0.047MF Z (TAPPING)	
C808	C ELECTRO	CEXF1H479V	50V RSS 4.7MF (5X11) TP	
C809	C CERA	CCXB1H102K	50V B 1000PF K (TAPPING)	
C810	C CERA SEMI	CBXB3D102K	2KV BL(N) 1000PF K (T)	
C812	C CERA AC	CH1BFE472M	AC400V 4700PF M U/C/V	△
C813	C ELECTRO	CEXF2C101V	160V RSS 100MF (16X25) TP	
C814	C ELECTRO	CEXF2C101V	160V RSS 100MF (16X25) TP	
C820	C CERA	CCXB3D151K	2KV B 150PF K (TAPPING)	
C821	C CERA	CCXB1H102K	50V B 1000PF K (TAPPING)	
C823	C ELECTRO	CEXF1E102V	25V RSS 1000MF (13X20) TP	
C830	C CERA SEMI	CBXF1H104Z	50V F 0.1MF Z (TAPPING)	
C832	C ELECTRO	CEXF1E102V	25V RSS 1000MF (13X20) TP	
C835	C ELECTRO	CEXF1C470V	16V RSS 47MF (5X11) TP	
C840	C ELECTRO	CEXF1C222V	16V RSS 2200MF (16X31.5) TP	

LOC	PART NAME	PART Code	PART Description	Remark
C841	C ELECTRO	CEXF1C222V	16V RSS 2200MF (16X31.5) TP	
C844	C ELECTRO	CEXF1E101V	25V RSS 100MF (6.3X11) TP	
C850	C CERA	CCXB1H152K	50V B 1500PF K (TAPPING)	
C861	C ELECTRO	CEXF1E102V	25V RSS 1000MF (13X20) TP	
C863	C ELECTRO	CEXF1E101V	25V RSS 100MF (6.3X11) TP	
C905	C ELECTRO	CEXF2E479V	250V RSS 4.7MF (10X16)TP	
C906	C ELECTRO	CEXF2E100V	250V RSS 10MF (10X20) TP	
C965	C CERA SEMI	CBXB3D102K	2KV BL(N) 1000PF K (T)	
C968	C MYLAR	CMXL2E104K	250V MEU 0.1MF K	
CA01	C CERA	CCZB1H271K	50V B 270PF K	
CA03	C CERA	CCZB1H271K	50V B 270PF K	
CA13	C CERA	CCZB1H271K	50V B 270PF K	
CA14	C CERA	CCZB1H271K	50V B 270PF K	
D101	DIODE	D1N4148 -	1N4148 (TAPPING)	
D313	DIODE	D1N4937G	1N4937G (TAPPING)	
D360	DIODE ZENER	D U Z 3 3 B	UZ-33B	
D361	DIODE ZENER	D U Z 3 3 B	UZ-33B	
D367	DIODE ZENER	D U Z 3 3 B	UZ-33B	
D381	DIODE ZENER	D U Z 3 3 B	UZ-33B	
D403	DIODE	DDGP30L -	DGP30L	
D404	DIODE	DRGP15J -	RGP15J DO-204AC 600V 1.5A	
D405	DIODE	D1N4937G	1N4937G (TAPPING)	
D406	DIODE	DRGP15J -	RGP15J DO-204AC 600V 1.5A	
D407	DIODE	D1N4937G	1N4937G (TAPPING)	
D408	DIODE	D1N4937G	1N4937G (TAPPING)	
D410	DIODE	D1N4004S	1N4004S	
D411	DIODE	D1N4004S	1N4004S	
D450	DIODE	D1N4937G	1N4937G (TAPPING)	
D520	DIODE	D1N4148 -	1N4148 (TAPPING)	
D521	DIODE	D1N4148 -	1N4148 (TAPPING)	
D601	DIODE	D1N4148 -	1N4148 (TAPPING)	
D602	DIODE	D1N4148 -	1N4148 (TAPPING)	
D710	DIODE ZENER	DMTZJ5R1A-	MTZJ 5.1A	
D801	DIODE	DLT2A05G	LT2A05G (TP)	△
D802	DIODE	DLT2A05G	LT2A05G (TP)	△
D803	DIODE	DLT2A05G	LT2A05G (TP)	△
D804	DIODE	DLT2A05G	LT2A05G (TP)	△
D805	DIODE	D1N4937G	1N4937G (TAPPING)	
D806	DIODE	D1N4937G	1N4937G (TAPPING)	
D808	DIODE	D1N4937G	1N4937G (TAPPING)	
D809	DIODE	D1N4937G	1N4937G (TAPPING)	
D810	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
D811	DIODE ZENER	DMTZJ5R6B-	MTZJ 5.6B	
D818	DIODE	DRGP30J -	RGP30J DO-201AD 600V 3A	
D821	DIODE	D1N4937G	1N4937G (TAPPING)	
D824	DIODE	D1N4148 -	1N4148 (TAPPING)	

LOC	PART NAME	PART Code	PART Description	Remark
D825	DIODE	D1N4148 -	1N4148 (TAPPING)	
D830	DIODE	D1N4937G	1N4937G (TAPPING)	
D831	DIODE	D1N4937G	1N4937G (TAPPING)	
D840	DIODE	D1N4148 -	1N4148 (TAPPING)	
D841	DIODE	D1N4148 -	1N4148 (TAPPING)	
D860	DIODE	DRGP15J -	RGP15J DO-204AC 600V 1.5A	
D861	DIODE	DRGP15J -	RGP15J DO-204AC 600V 1.5A	
D862	DIODE	DRGP15J -	RGP15J DO-204AC 600V 1.5A	
D890	DIODE ZENER	DUZ33B	UZ-33B	
D891	DIODE	D1N4148 -	1N4148 (TAPPING)	
D892	DIODE ZENER	DUZ8R2BL	UZ-8.2BL	
D907	DIODE	DLT2A05G	LT2A05G (TP)	
DA02	DIODE ZENER	DMTZJ5R6B-	MTZJ 5.6B	
DF01	HOLDER LED ASSY	4858900002	LH-3P	
E004	EYE LET	4856310300	BSR T0.2 (R1.6)	
E005	EYE LET	4856310300	BSR T0.2 (R1.6)	
E006	EYE LET	4856310300	BSR T0.2 (R1.6)	
E007	EYE LET	4856310300	BSR T0.2 (R1.6)	
E008	EYE LET	4856310300	BSR T0.2 (R1.6)	
E009	EYE LET	4856310300	BSR T0.2 (R1.6)	
E010	EYE LET	4856310300	BSR T0.2 (R1.6)	
E011	EYE LET	4856310600	BSR T0.2 (R2.3)	
E012	EYE LET	4856310600	BSR T0.2 (R2.3)	
E013	EYE LET	4856310600	BSR T0.2 (R2.3)	
E014	EYE LET	4856310600	BSR T0.2 (R2.3)	
E015	EYE LET	4856310600	BSR T0.2 (R2.3)	
E016	EYE LET	4856310600	BSR T0.2 (R2.3)	
E017	EYE LET	4856310300	BSR T0.2 (R1.6)	
E018	EYE LET	4856310600	BSR T0.2 (R2.3)	
E019	EYE LET	4856310300	BSR T0.2 (R1.6)	
E021	EYE LET	4856310600	BSR T0.2 (R2.3)	
E025	EYE LET	4856310300	BSR T0.2 (R1.6)	
E026	EYE LET	4856310600	BSR T0.2 (R2.3)	
E027	EYE LET	4856310600	BSR T0.2 (R2.3)	
E028	EYE LET	4856310600	BSR T0.2 (R2.3)	
E029	EYE LET	4856310600	BSR T0.2 (R2.3)	
E030	EYE LET	4856310600	BSR T0.2 (R2.3)	
E031	EYE LET	4856310600	BSR T0.2 (R2.3)	
E032	EYE LET	4856310600	BSR T0.2 (R2.3)	
E033	EYE LET	4856310600	BSR T0.2 (R2.3)	
E034	EYE LET	4856310600	BSR T0.2 (R2.3)	
E036	EYE LET	4856310600	BSR T0.2 (R2.3)	
E037	EYE LET	4856310600	BSR T0.2 (R2.3)	
E038	EYE LET	4856310300	BSR T0.2 (R1.6)	
E039	EYE LET	4856310600	BSR T0.2 (R2.3)	



LOC	PART NAME	PART Code	PART Description	Remark
E040	EYE LET	4856310600	BSR T0.2 (R2.3)	
E043	EYE LET	4856310300	BSR T0.2 (R1.6)	
E044	EYE LET	4856310300	BSR T0.2 (R1.6)	
E045	EYE LET	4856310300	BSR T0.2 (R1.6)	
E046	EYE LET	4856310300	BSR T0.2 (R1.6)	
E047	EYE LET	4856310300	BSR T0.2 (R1.6)	
E048	EYE LET	4856310300	BSR T0.2 (R1.6)	
E049	EYE LET	4856310300	BSR T0.2 (R1.6)	
E050	EYE LET	4856310300	BSR T0.2 (R1.6)	
E051	EYE LET	4856310300	BSR T0.2 (R1.6)	
E052	EYE LET	4856310300	BSR T0.2 (R1.6)	
E053	EYE LET	4856310300	BSR T0.2 (R1.6)	
E054	EYE LET	4856310300	BSR T0.2 (R1.6)	
E057	EYE LET	4856310600	BSR T0.2 (R2.3)	
E058	EYE LET	4856310600	BSR T0.2 (R2.3)	
E059	EYE LET	4856310600	BSR T0.2 (R2.3)	
E060	EYE LET	4856310600	BSR T0.2 (R2.3)	
E061	EYE LET	4856310300	BSR T0.2 (R1.6)	
E062	EYE LET	4856310300	BSR T0.2 (R1.6)	
E063	EYE LET	4856310300	BSR T0.2 (R1.6)	
E064	EYE LET	4856310300	BSR T0.2 (R1.6)	
E066	EYE LET	4856310300	BSR T0.2 (R1.6)	
E069	EYE LET	4856310300	BSR T0.2 (R1.6)	
E077	EYE LET	4856310300	BSR T0.2 (R1.6)	
E078	EYE LET	4856310300	BSR T0.2 (R1.6)	
E079	EYE LET	4856310300	BSR T0.2 (R1.6)	
E116	EYE LET	4856310600	BSR T0.2 (R2.3)	
E118	EYE LET	4856310600	BSR T0.2 (R2.3)	
F801	FUSE	5FWPS4022L	WIDE TL 250V 4A CASE	△
	FUSE GLASS TUBE	5FSGB4022L	SEMKO TL 4A 250V MF51	COMPATIBLE(△)
F801A	CLIP FUSE	4857415001	PFC5000-0702	WHEN 5FSGB4022L IS USED
F801B	CLIP FUSE	4857415001	PFC5000-0702	WHEN 5FSGB4022L IS USED
G900	SPARK GAP	4SG0DX0001	SSG-102-A1(1.0KV) TAP	
G901	SPARK GAP	4SG0DX0001	SSG-102-A1(1.0KV) TAP	
G902	SPARK GAP	4SG0DX0001	SSG-102-A1(1.0KV) TAP	
G903	SPARK GAP	4SG0DX0001	SSG-102-A1(1.0KV) TAP	
I301	HEAT SINK ASS'Y	PTA2SW8214	1TDA8358J- + 7174301011	
I601	IC SOUND PROCESSOR	1MSP3410V3	MSP3410G-PP-B8-V3	
I602	HEAT SINK ASS'Y	PTA2SW8215	1TDA8946J- + 7174301011	
I702	IC	1AT24C08PC	AT24C08-10PC	
I703	IC PREAMP	1TS0P1238W	TS0P1238WI1	
I801	HEAT SINK ASS'Y	PTF2SW7920	1STRF6653- + 7174301211	
I804	IC PHOTO COUPLER	1KP1010C	KP-1010C	△
I806	IC ERROR AMP	1 D P 1 4 2	DP142	SE130N ==>R823 Must be 330ohm
I810	THYRISTOR	TX0202DA	X0202DA1BA2	
I820	IC REGULATOR	1KA7805 -	KA7805	

LOC	PART NAME	PART Code	PART Description	Remark
I823	IC REGULATOR	1LP295033-	LP2950 3.3V	
I901	HEAT SINK ASS'Y	PT12SW5401	1TDA6107Q- + 7174301011	
I901	IC VIDEO AMP	1TDA6107Q-	TDA6107Q	
I901A	HEAT SINK	4857025401	A1050P-H24 T2	
I901B	SCREW TAPPTITE	7174301011	TT2 RND 3X10 MFZN	
IA01	IC AV SWITCH	1MM1053XS-	MM1053XS	
J001	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J002	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J003	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J004	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J005	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J006	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J007	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J008	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J009	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J010	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J011	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J012	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J013	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J014	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J015	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J016	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J017	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J018	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J019	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J020	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J021	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J022	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J023	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J024	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J025	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J026	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J027	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J028	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J029	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J030	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J031	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J032	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J033	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J034	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J035	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J036	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J037	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J038	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J039	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J040	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	

LOC	PART NAME	PART Code	PART Description	Remark
J041	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J042	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J043	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J044	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J045	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J046	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J047	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J048	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J049	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J050	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J051	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J052	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J053	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J054	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J055	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J056	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J057	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J058	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J060	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J061	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J062	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J063	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J064	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J065	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J066	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J067	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J068	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J069	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J070	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J071	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J072	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J073	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J074	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J075	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J076	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J077	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J079	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J080	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J081	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J082	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J083	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J084	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J085	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J086	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J088	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J089	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	

LOC	PART NAME	PART Code	PART Description	Remark
J090	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J091	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J093	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J094	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J096	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J097	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J098	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J099	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J100	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J102	R M-OXIDE FILM	RS01Z569J-	1W 5.6 OHM J (TAPPING)	
J103	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J104	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J302	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J303	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J500	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J601	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J602	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J603	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
J604	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
JPA1	JACK PIN BOARD	4859109250	PH-JB-9614A	
JPA3	JACK PIN BOARD	4859111750	PH-JB-9515	
L101	COIL PEAKING	5CPZ100K02	10UH K (AXIAL 3.5MM)	
L350	COIL PEAKING	5CPZ109M04	1UH 10.5MM M (LAL04TB)	
L381	COIL PEAKING	5CPZ109M04	1UH 10.5MM M (LAL04TB)	
L401	COIL H-LINEARITY	58H0000047	TRL-190D	
L402	COIL CHOKE	58C7070085	TLN-3062A	
L500	COIL PEAKING	5CPZ120K02	12UH K (AXIAL 3.5MM)	
L501	COIL PEAKING	5CPZ100K02	10UH K (AXIAL 3.5MM)	
L502	COIL PEAKING	5CPZ100K02	10UH K (AXIAL 3.5MM)	
L510	COIL PEAKING	5CPZ100K02	10UH K (AXIAL 3.5MM)	
L511	COIL PEAKING	5CPZ100K02	10UH K (AXIAL 3.5MM)	
L512	COIL PEAKING	5CPZ100K02	10UH K (AXIAL 3.5MM)	
L601	COIL PEAKING	5CPZ479K02	4.7UH K (AXIAL 3.5MM)	
L602	COIL PEAKING	5CPZ479K02	4.7UH K (AXIAL 3.5MM)	
L603	COIL PEAKING	5CPZ479K02	4.7UH K (AXIAL 3.5MM)	
L650	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
L801	COIL BEAD	5MC0000100	HC-3550	
L802	COIL CHOKE	58CX430599	AZ-9004Y 940K TP	
L803	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
LF801	FILTER LINE	5PLF24A1	LF-24A1	△
N001	TERM PIN	4857417500	DA-IB0214(D2.3/DY PIN)	
N002	TERM PIN	4857417500	DA-IB0214(D2.3/DY PIN)	
N003	TERM PIN	4857417500	DA-IB0214(D2.3/DY PIN)	
N004	TERM PIN	4857417500	DA-IB0214(D2.3/DY PIN)	
N401	TERM PIN	4857417500	DA-IB0214(D2.3/DY PIN)	
N402	TERM PIN	4857417500	DA-IB0214(D2.3/DY PIN)	

LOC	PART NAME	PART Code	PART Description	Remark
N403	TERM PIN	4857417500	DA-IB0214(D2.3/DY PIN)	
N404	TERM PIN	4857417500	DA-IB0214(D2.3/DY PIN)	
P401	CONNECTOR	4850705N19	YBNH250+YBNT250+ULW=400	
P501	CONNECTOR	4850705N14	YBNH250-05+YBNH250+ULW500	
P601	CONN WAFER	485923172S	YW025-04 (STICK)	
P602	CONN WAFER	485923522S	YW025-09 (STICK)	
P904	CONN WAFER	4859238620	YPW500-02	
PWC1	CORD POWER AS	4859903010	SAA LP-15A YFH800 2.6M	△
Q101	TR	TKTC3198Y-	KTC3198Y	
Q401	HEAT SINK ASS'Y	PTG2SW7609	TST2009DH1 + 7174300811	2SD-2553 ==>COMPABLE
Q402	TR	TKTC3229	KTC3229	
Q501	TR	TKTA1266Y-	KTA1266Y (TP)	
Q502	TR	TKTC3198Y-	KTC3198Y	
Q503	TR	TKTC3198Y-	KTC3198Y	
Q504	TR	TKTC3198Y-	KTC3198Y	
Q505	TR	TKTA1266Y-	KTA1266Y (TP)	
Q506	TR	TKTC3198Y-	KTC3198Y	
Q507	TR	TKTC3198Y-	KTC3198Y	
Q508	TR	TKTC3198Y-	KTC3198Y	
Q509	TR	TKTC3198Y-	KTC3198Y	
Q601	TR	TKTA1266Y-	KTA1266Y (TP)	
Q807	TR	TKTC3198Y-	KTC3198Y	
Q808	TR	TKTC3198Y-	KTC3198Y	
Q809	TR	TKTC3198Y-	KTC3198Y	
Q810	TR	TKTC3198Y-	KTC3198Y	
Q811	TR	TKTC3198Y-	KTC3198Y	
Q822	TR	TKTC3205Y-	KTC3205Y (TP)	
R101	R CARBON FILM	RD-AZ473J-	1/6 47K OHM J	
R102	R CARBON FILM	RD-AZ472J-	1/6 4.7K OHM J	
R103	R CARBON FILM	RD-AZ123J-	1/6 12K OHM J	
R104	R CARBON FILM	RD-AZ104J-	1/6 100K OHM J	
R105	R CARBON FILM	RD-AZ392J-	1/6 3.9K OHM J	
R106	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R107	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R115	R CARBON FILM	RD-AZ682J-	1/6 6.8K OHM J	
R116	R CARBON FILM	RD-AZ222J-	1/6 2.2K OHM J	
R120	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R310	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
R311	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
R331	R M-OXIDE FILM	RS01Z331J-	1W 330 OHM J (TAPPING)	
R340	R CARBON FILM	RD-4Z473J-	1/4 47K OHM J	
R350	R METAL FILM	RN-4Z1501F	1/4 1.50K OHM F	
R351	R METAL FILM	RN-4Z1501F	1/4 1.50K OHM F	
R370	R CARBON FILM	RD-4Z159J-	1/4 1.5 OHM J	
R393	R CARBON FILM	RD-2Z279J-	1/2 2.7 OHM J	
R394	R CARBON FILM	RD-AZ272J-	1/6 2.7K OHM J	

LOC	PART NAME	PART Code	PART Description	Remark
R395	R CARBON FILM	RD-AZ824J-	1/6 820K OHM J	
R396	R CARBON FILM	RD-AZ272J-	1/6 2.7K OHM J	
R397	R CARBON FILM	RD-AZ823J-	1/6 82K OHM J	
R398	R CARBON FILM	RD-2Z129J-	1/2 1.2 OHM J	
R399	R M-OXIDE FILM	RS02Z120JS	2W 12 OHM J SMALL	
R401	R CARBON FILM	RD-4Z272J-	1/4 2.7K OHM J	
R402	R CARBON FILM	RD-4Z220J-	1/4 22 OHM J	
R404	R CARBON FILM	RD-4Z399J-	1/4 3.9 OHM J	
R406	R M-OXIDE FILM	RS02Z271JS	2W 270 OHM J SMALL	
R415	R M-OXIDE FILM	RS02Z102JS	2W 1K OHM J SMALL	
R420	R CARBON FILM	RD-AZ223J-	1/6 22K OHM J	
R427	R M-OXIDE FILM	RS01Z101J-	1W 100 OHM J (TAPPING)	
R450	R M-OXIDE FILM	RS02Z223JS	2W 22K OHM J SMALL	
R481	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
R482	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
R501	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R502	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R503	R CARBON FILM	RD-AZ332J-	1/6 3.3K OHM J	
R504	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R505	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R506	R CARBON FILM	RD-AZ332J-	1/6 3.3K OHM J	
R507	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R508	R CARBON FILM	RD-AZ332J-	1/6 3.3K OHM J	
R509	R CARBON FILM	RD-AZ681J-	1/6 680 OHM J	
R512	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R513	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R515	R CARBON FILM	RD-AZ153J-	1/6 15K OHM J	
R516	R CARBON FILM	RD-AZ393J-	1/6 39K OHM J	
R517	R CARBON FILM	RD-4Z181J-	1/4 180 OHM J	
R518	R CARBON FILM	RD-AZ273J-	1/6 27K OHM J	
R520	R CARBON FILM	RD-AZ333J-	1/6 33K OHM J	
R521	R CARBON FILM	RD-AZ391J-	1/6 390 OHM J	
R522	R CARBON FILM	RD-AZ221J-	1/6 220 OHM J	
R523	R CARBON FILM	RD-AZ331J-	1/6 330 OHM J	
R524	R CARBON FILM	RD-AZ561J-	1/6 560 OHM J	
R525	R CARBON FILM	RD-AZ104J-	1/6 100K OHM J	
R526	R CARBON FILM	RD-AZ479J-	1/6 4.7 OHM J	
R527	R CARBON FILM	RD-AZ431J-	1/6 430 OHM J	
R528	R CARBON FILM	RD-AZ221J-	1/6 220 OHM J	
R530	R CARBON FILM	RD-AZ473J-	1/6 47K OHM J	
R531	R CARBON FILM	RD-AZ182J-	1/6 1.8K OHM J	
R533	R CARBON FILM	RD-AZ103J-	1/6 10K OHM J	
R537	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R538	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R539	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R540	R CARBON FILM	RD-AZ223J-	1/6 22K OHM J	

LOC	PART NAME	PART Code	PART Description	Remark
R541	R CARBON FILM	RD-AZ162J-	1/6 1.6K OHM J	
R543	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
R545	R CARBON FILM	RD-AZ512J-	1/6 5.1K OHM J	
R546	R CARBON FILM	RD-AZ392J-	1/6 3.9K OHM J	
R547	R CARBON FILM	RD-AZ392J-	1/6 3.9K OHM J	
R548	R CARBON FILM	RD-AZ472J-	1/6 4.7K OHM J	
R549	R CARBON FILM	RD-AZ182J-	1/6 1.8K OHM J	
R551	R CARBON FILM	RD-AZ512J-	1/6 5.1K OHM J	
R553	R CARBON FILM	RD-AZ112J-	1/6 1.1K OHM J	
R554	R CARBON FILM	RD-AZ472J-	1/6 4.7K OHM J	
R555	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
R556	R CARBON FILM	RD-AZ472J-	1/6 4.7K OHM J	
R557	R CARBON FILM	RD-AZ122J-	1/6 1.2K OHM J	
R560	R CARBON FILM	RD-4Z221J-	1/4 220 OHM J	
R562	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R564	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R567	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R570	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
R580	R CARBON FILM	RD-4Z271J-	1/4 270 OHM J	
R585	R CARBON FILM	RD-AZ224J-	1/6 220K OHM J	
R586	R CARBON FILM	RD-AZ221J-	1/6 220 OHM J	
R597	R METAL FILM	RN-4Z1502F	1/4 15K OHM F	
R598	R METAL FILM	RN-4Z1502F	1/4 15K OHM F	
R599	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R605	R CARBON FILM	RD-AZ751J-	1/6 750 OHM J	
R606	R CARBON FILM	RD-AZ751J-	1/6 750 OHM J	
R610	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
R611	R CARBON FILM	RD-AZ104J-	1/6 100K OHM J	
R620	R CARBON FILM	RD-AZ752J-	1/6 7.5K OHM J	
R621	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R622	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R650	R CARBON FILM	RD-AZ822J-	1/6 8.2K OHM J	
R660	R CARBON FILM	RD-AZ822J-	1/6 8.2K OHM J	
R661	R CARBON FILM	RD-AZ822J-	1/6 8.2K OHM J	
R662	R CARBON FILM	RD-AZ822J-	1/6 8.2K OHM J	
R663	R CARBON FILM	RD-4Z829J-	1/4 8.2 OHM J	
R664	R CARBON FILM	RD-4Z829J-	1/4 8.2 OHM J	
R700	R CARBON FILM	RD-2Z332J-	1/2 3.3K OHM J	
R710	R CARBON FILM	RD-AZ271J-	1/6 270 OHM J	
R711	R CARBON FILM	RD-AZ271J-	1/6 270 OHM J	
R713	R CARBON FILM	RD-AZ331J-	1/6 330 OHM J	
R720	R CARBON FILM	RD-AZ122J-	1/6 1.2K OHM J	
R721	R CARBON FILM	RD-AZ221J-	1/6 220 OHM J	
R722	R CARBON FILM	RD-AZ331J-	1/6 330 OHM J	
R723	R CARBON FILM	RD-AZ471J-	1/6 470 OHM J	
R724	R CARBON FILM	RD-AZ821J-	1/6 820 OHM J	

LOC	PART NAME	PART Code	PART Description	Remark
R726	R CARBON FILM	RD-AZ181J-	1/6 180 OHM J	
R801	POSISTOR	DPC7R0M290	2322 662 96709	COMPATIBLE(△)
		DDC7R0M290	ECPCD7R0M290	△
R802	R M-OXIDE FILM	RS02Z753JS	2W 75K OHM J SMALL	
R804	R FUSIBLE	RF02Z158K-	2W 0.15 OHM K (TAPPING)	
R805	R CARBON FILM	RD-2Z100J-	1/2 10 OHM J	
R806	R CARBON FILM	RD-4Z472J-	1/4 4.7K OHM J	
R807	R CARBON FILM	RD-2Z272J-	1/2 2.7K OHM J	
R808	R CARBON FILM	RD-4Z911J-	1/4 910 OHM J	
R810	R CARBON FILM	RD-4Z102J-	1/4 1K OHM J	
R811	R CARBON COMP	RC-2Z565KP	1/2 5.6M OHM K	△
R817	R CARBON FILM	RD-AZ473J-	1/6 47K OHM J	
R819	R CEMENT	RX10B339JQ	10W 3.3 OHM J BEN 25MM 4P	
R820	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
R821	R CARBON FILM	RD-4Z102J-	1/4 1K OHM J	
R823	R CARBON FILM	RD-4Z331J-	1/4 330 OHM J	When I806 is DP142(or SE140)
		RD-4Z512J-	1/4 5.1K OHM J	When I806 IS SE130
R829	R CARBON FILM	RD-AZ223J-	1/6 22K OHM J	
R830	R CARBON FILM	RD-AZ332J-	1/6 3.3K OHM J	
R840	R CARBON FILM	RD-4Z220J-	1/4 22 OHM J	
R841	R CARBON FILM	RD-2Z479J-	1/2 4.7 OHM J	
R842	R CARBON FILM	RD-2Z479J-	1/2 4.7 OHM J	
R843	R CARBON FILM	RD-AZ561J-	1/6 560 OHM J	
R844	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
R850	R CARBON FILM	RD-2Z479J-	1/2 4.7 OHM J	
R855	R CARBON FILM	RD-4Z185J-	1/4 1.8M OHM J	
R870	R CARBON FILM	RD-2Z222J-	1/2 2.2K OHM J	
R888	R CARBON FILM	RD-AZ103J-	1/6 10K OHM J	
R910	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R911	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R912	R CARBON FILM	RD-AZ101J-	1/6 100 OHM J	
R913	R CARBON COMP	RC-2Z102K-	1/2 1K OHM K	
R914	R CARBON COMP	RC-2Z102K-	1/2 1K OHM K	
R915	R CARBON COMP	RC-2Z102K-	1/2 1K OHM K	
R920	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
R921	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
R922	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
R923	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
R924	R CARBON FILM	RD-4Z105J-	1/4 1M OHM J	
R925	R CARBON FILM	RD-4Z102J-	1/4 1K OHM J	
RA01	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
RA02	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
RA03	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
RA04	R CARBON FILM	RD-AZ910J-	1/6 91 OHM J	
RA05	R CARBON FILM	RD-AZ750J-	1/6 75 OHM J	
RA06	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	



LOC	PART NAME	PART Code	PART Description	Remark
RA07	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
RA08	R CARBON FILM	RD-AZ750J-	1/6 75 OHM J	
RA11	R CARBON FILM	RD-AZ750J-	1/6 75 OHM J	
RA16	R CARBON FILM	RD-AZ910J-	1/6 91 OHM J	
RA40	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
RA41	R CARBON FILM	RD-AZ102J-	1/6 1K OHM J	
SCT1	SOCKET CRT	4859303530	PCS629-03C	△
		48592303830	ISMG94S	COMPATIBLE( △ )
SD2	RETA PCB	4853747800	NYLON 66	
SF01	FILTER SAW	5PK3953M	K3953M	
SF02	FILTER SAW	5PK9650M	K9650M	
SW700	SW TACT	5S50101090	THVH472GCA	
SW701	SW TACT	5S50101090	THVH472GCA	
SW702	SW TACT	5S50101090	THVH472GCA	
SW703	SW TACT	5S50101090	THVH472GCA	
SW704	SW TACT	5S50101090	THVH472GCA	
SW706	SW TACT	5S50101090	THVH472GCA	
SW801	SW POWER PUSH	5S40101143	PS3-22SP (P.C.B)	△
T401	TRANS DRIVE	50D19A1 -	TD-19A1	
T402	FBT	50H0000247	FFA64028L	
T801	TRANS SMPS	50M4950A8-	TSM-4950A8	△
U100	TUNER VARACTOR	4859721530	DT5-BF18D N	
X502	CRYSTAL QUARTZ	5XEX12R00E	HC-49/U 12.000MHZ 30PPM TP	
X601	CRYSTAL QUARTZ	5XEX18R43E	HC-49/U 18.432MHZ 30PPM TP	
Z501	FILTER CERA	5PXXT5R5MB	XT 5.5MB-TP	

### 6-3. Control Assembly Parts Lists

LOC	PART NAME	PART Code	PART Description	Remark
A001	PCB UNION	4859811060	246X246	
CS01	C ELECTRO	CEXF1H479V	50V RSS 4.7MF (5X11) TP	
CS02	C ELECTRO	CEXF1H479V	50V RSS 4.7MF (5X11) TP	
DS01	DIODE ZENER	DMTZJ5R6B-	MTZJ 5.6B	
HP01	JACK PHONE	4859105240	LGT1516-0100	
JPA02	JACK PIN BOARD	4859105450	YSC03P-4120-9S	
JS01	WIRE COPPER	85801065GY	AWG22 1/0.65 TIN COATING	
P603	CONNECTOR	4850709S03	YH025-09+YST025+ULW=400	
RS01	R CARBON FILM	RD-2Z151J-	1/2 150 OHM J	
RS02	R CARBON FILM	RD-2Z151J-	1/2 150 OHM J	
RS04	R CARBON FILM	RD-AZ473J-	1/6 47K OHM J	
RS05	R CARBON FILM	RD-AZ473J-	1/6 47K OHM J	

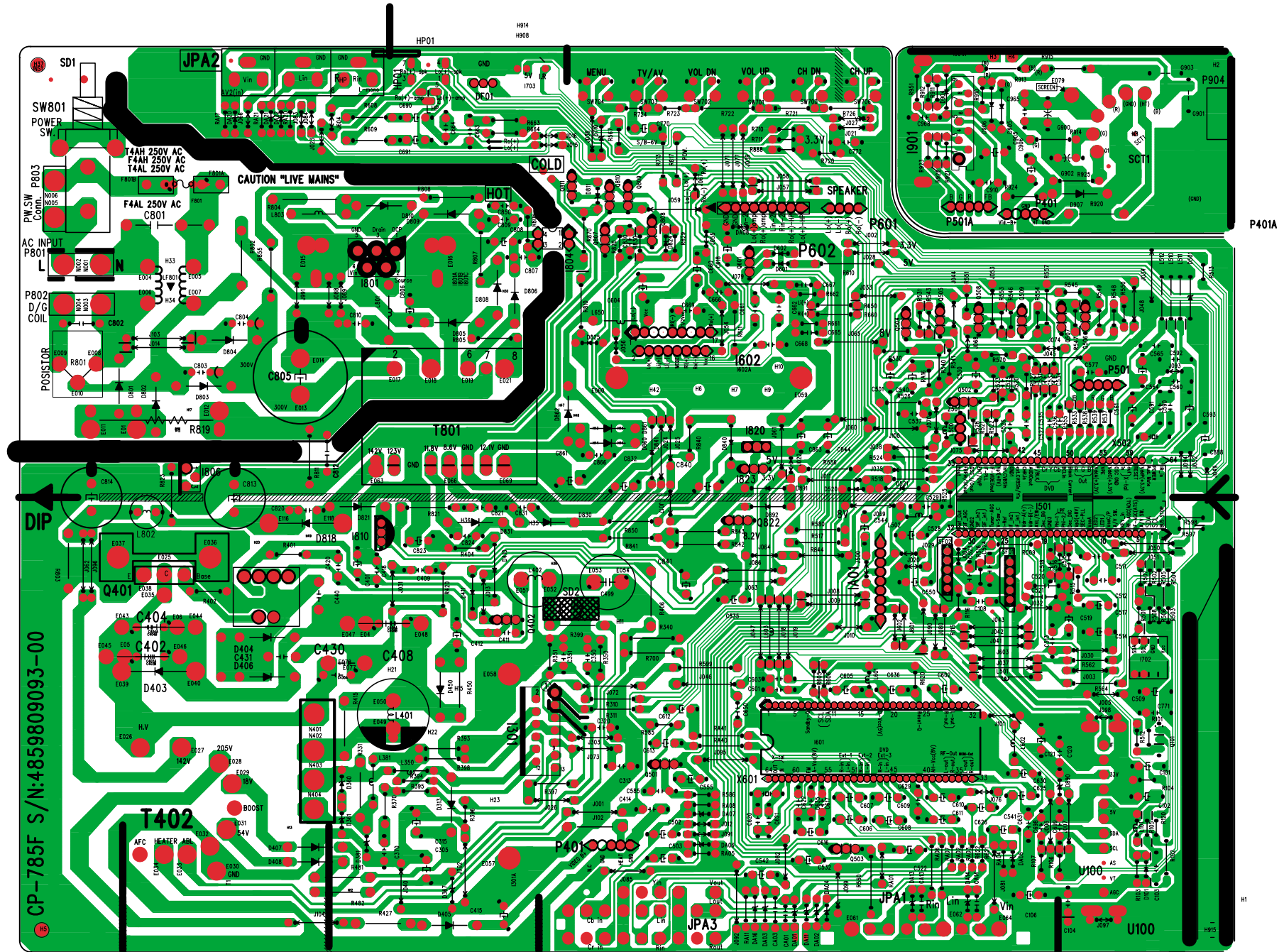
## 6-4. Compatible Components List

Part Name	Applied Locations	Compatible Components				Original	
		Part Code	Part Description	Manufacturer	Part Code	Part Description	Manufacturer
C ELECTRO	C813	CEVF2D101V	200V RSS 100MF (16X31.5)	-	CEXF2C101V	160V RSS 100MF (16X25) TP	-
C ELECTRO	C814	CEXF2E470V	250V RSS 47MF (16X25) TP	-	CEXF2C101V	160V RSS 100MF (16X25) TP	-
C ELECTRO	C805	CEYN2G181P	400V LHS 180MF (25X35)	-	CEYN2W151P	450V LHS 150MF (25X40)	-
C CERA AC	C812	CH1AFE472M	4KV 4700PF M KX DE1610	-	CH1BFE472M	AC400V 4700PF M U/C/V	-
C CERA	C103 and more	CCZB1H102K	50V B 1000PF K	-	CCXB1H102K	50V B 1000PF K	-
C CERA	C513 and more	CBZF1H104Z	50V F 0.1MF Z	-	CBXF1H104Z	50V F 0.1MF Z	-
C CERA	C533	CCZB1H102K	50V B 1000PF K	-	CCXB1H102K	50V B 1000PF K	-
C CERA	C534 and more	CCZF1H223Z	50V F 0.022MF Z	-	CCXF1H223Z	50V F 0.022MF Z	-
C CERA	C577	CCZB1H561K	50V B 560PF K	-	CCXB1H561K	50V B 560PF K	-
C CERA	C650 and more	CZSL1H470J	50V SL 47PF J	-	CXCH1H470J	50V CH 47PF J	-
C CERA	*C771,C830*	CBZF1H104Z	50V F 0.1MF Z	-	CBXF1H104Z	50V F 0.1MF Z	-
C CERA	C809	CCZB1H102K	50V B 1000PF K	-	CCXB1H102K	50V B 1000PF K	-
C CERA	*C665,C667*	CCXB1H472K	50V B 4700PF K	-	CBZR1C472M	16V Y5R 4700PF M	-
DIODE ZENER	D360 and more	1UPC574J--	UPC574J	-	DUZ33B----	UZ-33B	-
DIODE	D403	DDG3-----	DG3	-	DDGP30L---	DGP30L	-
IC REGULATOR	I820	1K1A7805P1-	K1A7805API	KEC	1KA7805---	KA7805	FAIRCHILD
		1L7805CV--	L7805CV	STM			
IC REGULATOR	I823	1LE33CZ---	LE33CZ	STM	1LP295033-	LP2950 3.3V	UNISONIC
IC PHOTO COUPLER	I804	1KP1010C--	KP-1010C	COSMO	1PC817C---	PC817C	SHARP
					1LTV817C--	LTV817C	LITEON
IC EEPROM	I702	124LC08B--	24LC08B	MICROCHIP	1AT24C08PC	AT24C08-10PC	ATMEL
		1CAT24C08P	CAT24WC08P	CATALYST			
		1M24C08BN6	M24C08-BN6	STM			
IC SMPS	I801	1STRF6654-	STR-F6654	SANKEN	1STRF6653-	STR-F6653	SANKEN
TR	*Q501,Q601*	TKSA733CY-	KSA733CY	FAIRCHILD	TKTA1266Y-	KTA1266Y (TP)	KEC
		TSTA933Y--	ST A945Y	AUK			
TR	Q101 and More	TKSC945CY	KSC945CY	FAIRCHILD	TKTC3198Y-	KTC3198Y	KEC
		TSTC1740Y-	STC1740Y	AUK			
TR	Q401	T2SD2553--	2SD2553	TOSHIBA	TST2009DH1	ST2009DHI	STM

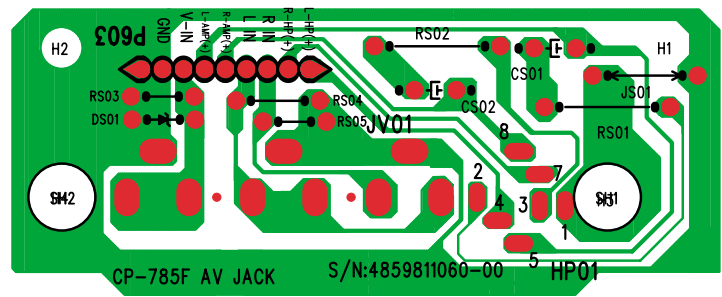
Axial Type & Radial Type

Diode Maker's Package change



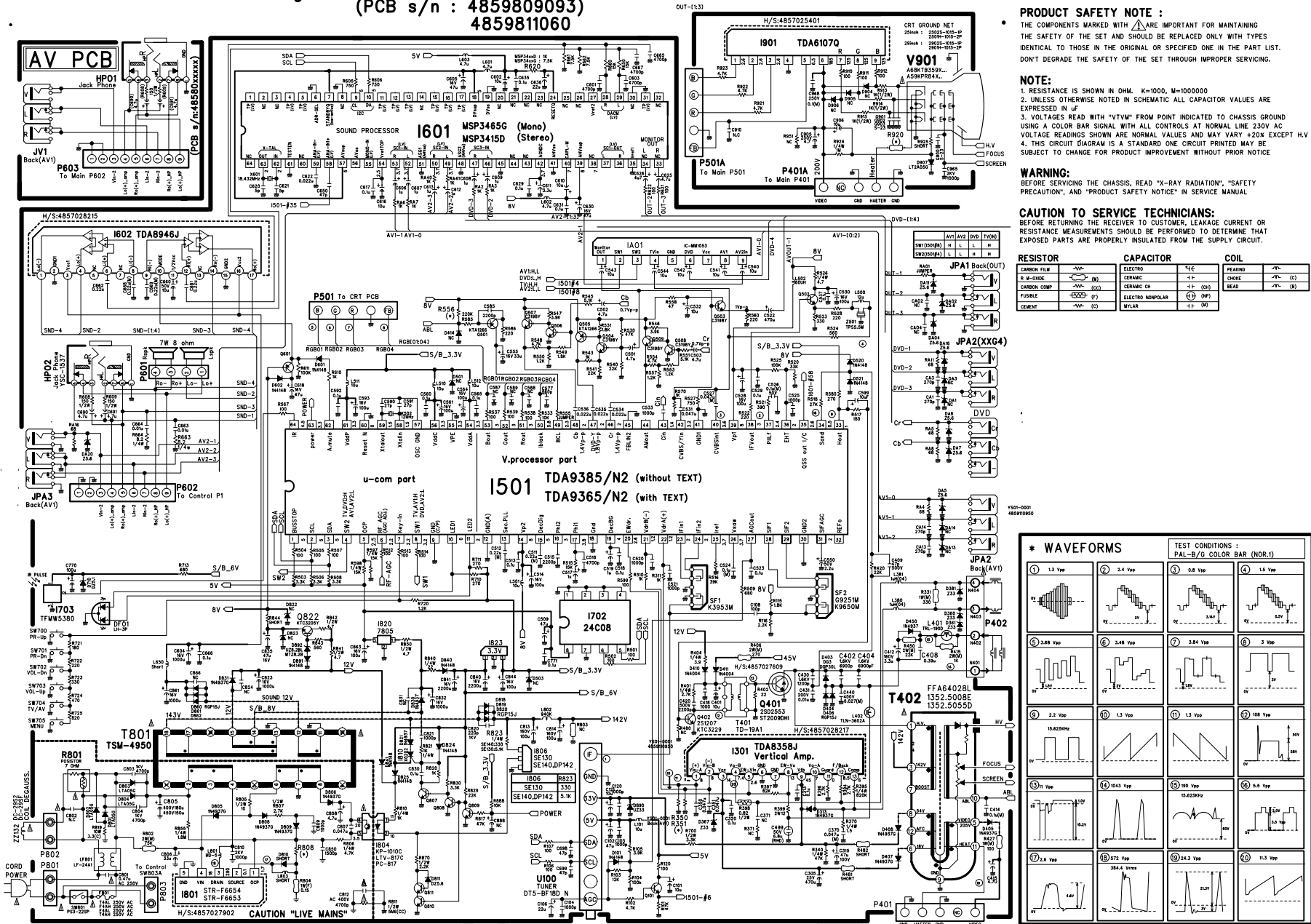


8-2. AV PCB



9 - Circuit Diagram

CP-785FSchematic Diagram (Ver.01-LPP , 2003/11/11)  
(PCB s/n : 4859809093)  
4859811060



**PRODUCT SAFETY NOTE :**

THE COMPONENTS MARKED WITH ARE IMPORTANT FOR MAINTAINING THE SAFETY OF THE SET AND SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL OR SPECIFIED ONE IN THE PART LIST. DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

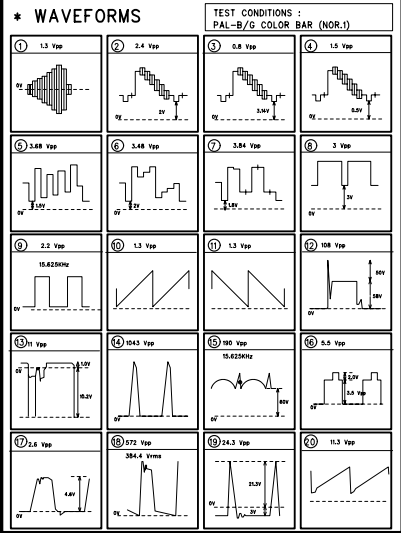
**NOTE:**

1. RESISTANCE IS SHOWN IN OHM. K=1000, M=1000000  
2. UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITOR VALUES ARE EXPRESSED IN uF  
3. VOLTAGES READ WITH "VTVM" FROM POINT INDICATED TO CHASSIS GROUND USING A COLOR BAR SIGNAL WITH ALL CONTROLS AT NORMAL LINE 230V AC. VOLTAGE READINGS SHOWN ARE NORMAL VALUES AND MAY VARY +20% EXCEPT H.V.  
4. THIS CIRCUIT DIAGRAM IS A STANDARD ONE CIRCUIT PRINTED MAY BE SUBJECT TO CHANGE FOR PRODUCT IMPROVEMENT WITHOUT PRIOR NOTICE

**WARNING:**

BEFORE RETURNING THE RECEIVER TO CUSTOMER, LEAKAGE CURRENT OR RESISTANCE MEASUREMENTS SHOULD BE PERFORMED TO DETERMINE THAT EXPOSED PARTS ARE PROPERLY INSULATED FROM THE SUPPLY CIRCUIT.

RESISTOR	CAPACITOR	COIL
CARBON FILM R W-CODE CARBON COMP. FUSIBLE CEMENT	WVA - (M) - (C) - (V) - (W)	ELECTRO T.C. CERAMIC CHROME ON ELECTRO NONPOLAR WILAR
		FEATHER - (M) CHROME - (M) - (W)



**NEC**  
**NEC Corporation**

7-1, SHIBA 5-CHOME MINATO-KU,  
TOKYO 108-8001, JAPAN